

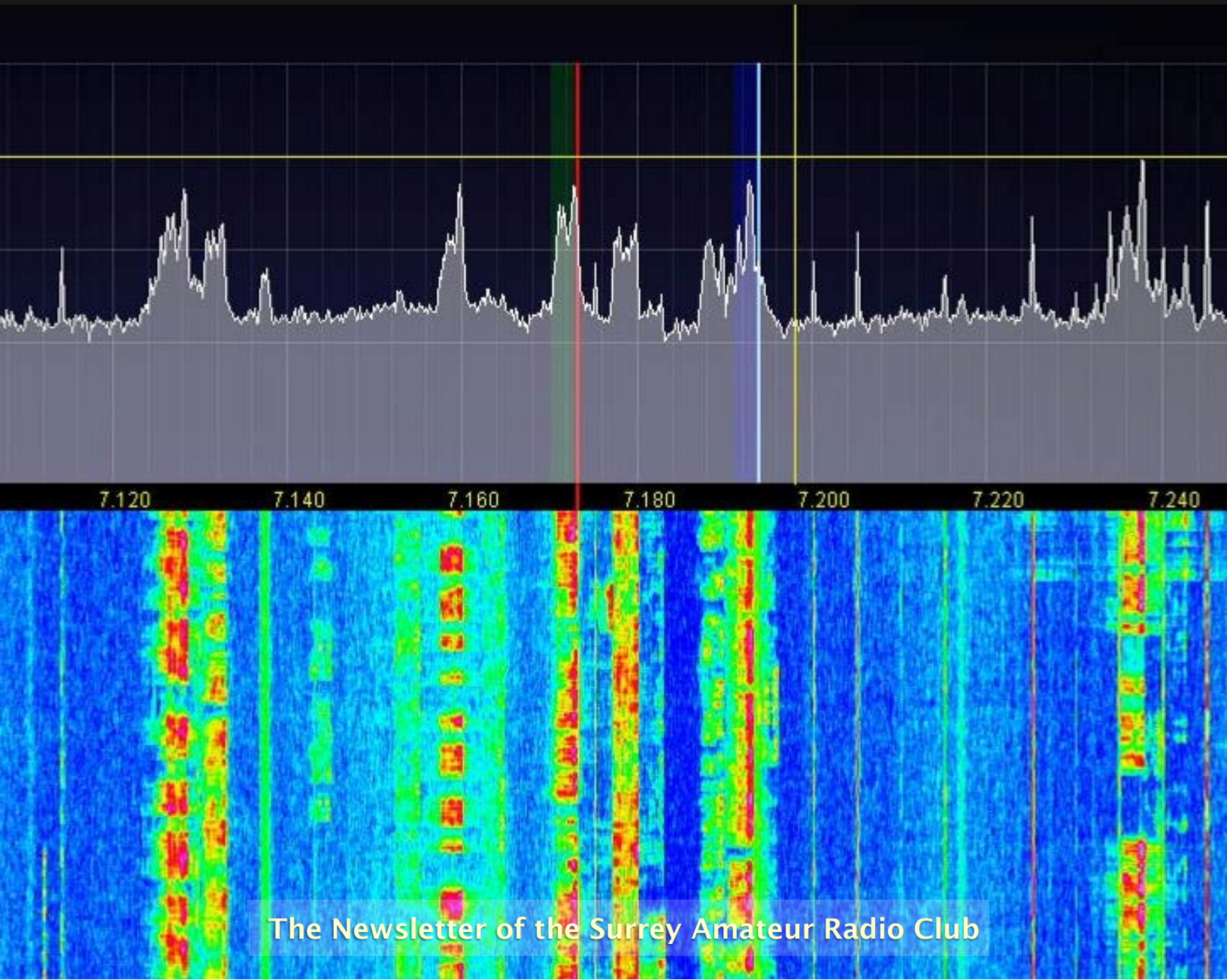


SARC

The Surrey Amateur Radio Club

**March
2017**

Communicator



The Newsletter of the Surrey Amateur Radio Club

March 2017



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Club Station News

John Brodie VA7XB

VE100VIMY/VE7



SARC contributed to the week-long VE100VIMY/VE7 event, by putting 2 stations on the air: Sheldon VA7XNL operated at the OTC on RTTY/SSB and Don VE7DS, Stan VA7NF, Robert VA7FMR and John VA7XB operating CW and RTTY at John's home station.

Things started out slowly as there was virtually no activity on 40m CW at 7 am on Friday, Feb. 17th. By 0800 our CQ on 20m was being heard by a few US stations but there were large gaps of 10-15 min where no contacts were made. As the day wore on, activity gradually picked up on 20m CW. Don VE7DS was able to work a few Europeans on CW during a 1 hour opening late morning but conditions were very challenging. At noon we switched over to 15m RTTY but the band was virtually dead at least on this mode, with only one confirmed contact (Aruba). Giving up on 15m, we returned to 20m CW but it wasn't until mid afternoon when the JAs starting making an appearance that things got really busy. Once Stan VA7NF reversed the direction of the beam to west he was able to keep the pileup coming until 4 pm. At that point, the ARRL DX CW contest began and as VE100VIMY/VE7 was not likely to stimulate much interest against the contesters, we called it a day. Stan later observed that we should have continued on a WARC band (where there was no contest activity) but that did not occur to us at the time.

~ John VA7XB

Meanwhile at the OTC...

As reported by John VA7XB, SARC had two VE100VIMY/VE7 stations on the air for our allotted time on Friday, February 17th. I was at the OTC and assigned to work the digital modes (PSK31 and RTTY) in the morning and phone (SSB) in the afternoon. The 20m band conditions didn't seem that great in the morning but I did manage to make some contacts on PSK31 reaching into Ontario, Quebec, the eastern USA and down to Arizona and California. I suppose it being early on a week day it was to be expected.

After lunch I started calling CQ on 20m phone and things quickly picked up. With the beam pointed South East there were pile ups trying to return my CQ. Nice! A few difficult stations to pick out from the noise but it was active and fun. I had



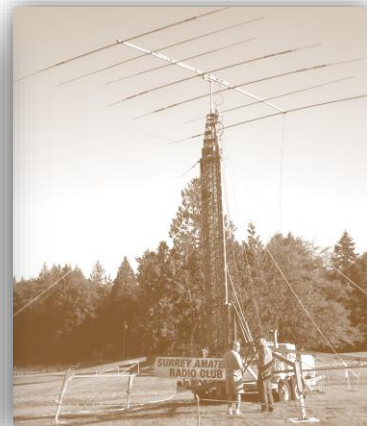
Stan Williams VA7NF working the JA pileup

contacts from California in the west to Chicago and Nebraska in the east and all the way down to Belize (Caribbean Sea) with Paul, VE3AXT, operating as V31AX.

After my assigned time on 20m I switched to 2m and 70cm SSB and made half a dozen contacts locally and into Washington. I enjoy seeing how far I can reach with SSB on the VHF+ frequencies.

Over all it was enjoyable and a good learning experience.

~ Sheldon VA7XNL



The SARC Communicator is published monthly except July and August for members of the Surrey Amateur Radio Club.

To subscribe, unsubscribe or change your address for e-mail delivery of this newsletter, notify SARCcommunicator@ve7sar.net

Non-members living in the Greater Vancouver area are asked to subscribe with a \$5 annual donation towards our Field Day fund.

SARC maintains a website at www.ve7sar.net and a Media website at docs.com/surrey-amateur-radio-club that includes past issues of The Communicator, club history, news, photos, videos and other information.



Sheldon at the OTC station



Above: Don Studney VE7DS (a VE100VIMY organizer who will participate in France)

Below: Robert Fishwick VA7FMR getting some pointers from Don Studney VE7DS

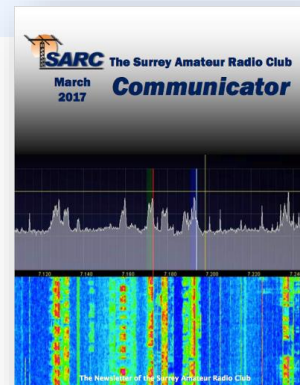
Kalmar Koffee Klatch Reminder



The SARC Weekly Koffee Klatch is on Saturday at the Kalmar Restaurant at 80th and King George Hwy in Surrey at 9:00 am. Bring your significant other, bring your family, see old friends and have fun.

On The Cover...

SDR Radio has increased in popularity in the past few years. You can spend thousands at the high end, or a few dollars if you want to experiment. This month's guest speaker is an expert, having experimented extensively, and he has written SDR software. See page 39 for more details. Hope to see you there.



March 2017



More VIMY

Fred Orsetti VE7IO

VE100VIMY/VE7 From My Perspective

See VE7100/VE7 in action from VE7IO:

<http://tinyurl.com/ve100vimy-ve7>

For those who may not be familiar with the battle of Vimy Ridge and the current project involving amateur radio please go to www.ve100vimy.ca. You will find an overview of this very important piece of Canadian history and the current amateur radio activities.

This article is about BC where we used VE100VIMY/VE7 and our experiences. There were 16 different stations involved with a total of 39 operators. The objectives were to have as many stations on the air as possible, give all stations an opportunity to participate, cover as many bands and modes as possible and to involve many operators. I believe we met all of our objectives.

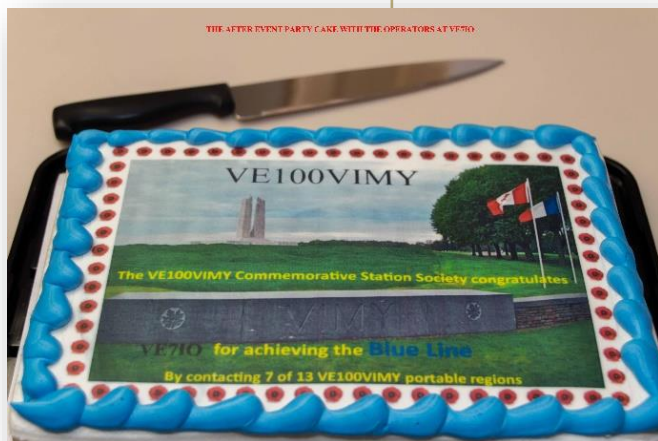
At this time we do not have final figures on the number of contacts however unofficially it is in excess of 4,500. We covered all bands, including the WARC bands, on SSB, CW, RTTY and PSK31.

What was it like to operate with such a mouthful of a call or send it on CW or RTTY? Well to provide some idea I will use my own station and our experienced operators to outline a typical operating session, we had three. We did the launch on Saturday February 11th (Sunday 12th UTC) at 4pm local time. We started with 3 radios, 2 tri-band beams, a 3

element SteppIR and wire antennas for 40, 80 and 160 meters. The operators for SSB were Christine, VA7NLF and Jeanne, VA7QD, for CW we had Stan, VA7NF and myself, VE7IO. We used N1MM+ with the appropriate macros and preprogrammed .wav files for the SSB ops. The radios were an Icom 7300, an Icom 7600 and a Flex 6700 all had legal limit amplifiers. We operated for about 6 hrs on 40, 80 and 160 and logged just over 300 Q's it was not very good but we had an opportunity to iron out some bugs.

The next scheduled operation from VE7IO was Wednesday when Marcy, VE7JT, would be solo on 20 meters. She operated for 3.0 hours and logged 233 Q's, this was getting better. Highlights during Marcy's time on the air included working Israel, working a high school round-up station in Kentucky, a special events station, DL70BERG, in Germany and a family of hams, YL, OM, and two YL harmonics.

Our next scheduled operating time was 7am on the final day, Saturday and again we planned for a three radio operation. There was a problem, the ARRL DX CW contest was in full swing so we limited ourselves to 17 meters for CW and it turned out well. We ran one radio on 20 SSB, one on 15 SSB and one on 17 CW it was a reasonably good setup. Ralph, VE7OM, started the day on 17 CW with slow but steady activity at 10:30 VA7NF, VA7NLF and VA7QD took over and worked until 4pm local time. Totally we worked 444 Q's with, surprisingly, 15 meter SSB leading the Q count. Seventeen meters was also productive with 20 SSB finishing a close third.



During the week I operated some of the open spots in the schedule, mostly overnight. I found that 40, 80 were good and 160 was OK at 3am. By far the most activity was on 40 meters to JA.

In summary the activities at VE7IO were likely representative of other stations so imagine during the week 16 different stations with several operators each QRV with VE100VIMY/VE7, it was impressive. Plus, this came one week after the BC QSO party so around the world amateur radio from British Columbia was well representative and a piece of Canadian history was brought to everyone's attention.

This was a once in a lifetime opportunity to use amateur radio as way to highlight a valuable piece of Canadian history from stations in BC. I have to say that the organizers of this project, Don, VE7DS and Keith, VE7KW have done an outstanding job and the best is yet to come when they are in France operating near the Vimy monument. They will be QRV with TM100VIMY on April 1st.

For me it was a very busy time leading up to our week of operation as I volunteered to do the BC schedule for VE100VIMY/VE7. During the week of operations I really enjoyed having my station on the air with experienced operators. We had a few "gotchas" but we had many laughs and great experiences that will be long remembered.

Please remember to work the other portable stations and to work TM100VIMY starting April 1st.

73

~ Fred VE7IO



March 2017

The Contest Contender

John Brodie VA7XB

Every Contest an Adventure!



BC QSO Party Feb. 4, 2017

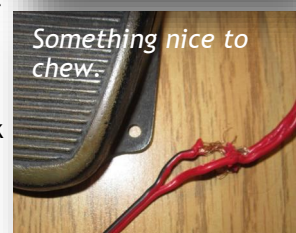
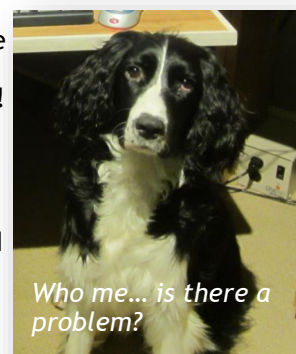
A fresh dump of snow overnight, one of a series in recent weeks, along with temperatures hovering around freezing created havoc on the roads and prevented several of our planned operators from getting to the station of their choice.

The BC QSO Party is one of our favourite contests because it is a friendly, rather low-pressure affair where stations across North America are looking exclusively for VE or VA stations. So we are the sought-after quarry. Search and pounce is not very productive for that reason - if you don't "run" (i.e. call CQ and have them come to you) this contest can be pretty boring, not to mention confusing. Several other contests were on at the same time with each requiring its own specific exchange; this meant that the ops had to be ready to give out the information needed by the other station. For BC stations the exchange was 59(9) + federal riding abbreviation.

SARC sponsored two contest stations for the BC QSO Party: VE7SAR from the Operations and Training Centre organized by Sheldon VA7XNL and VA7SRY from the home station of John VA7XB. Here was the experience at VA7SRY:

Lesson #1:

How comforting it can be to have man's best friend warming your feet below the operating position but ... better check what he's doing down there. This puppy was busy chewing through the foot pedal PTT wire while his master was busy above. The Grrr was from me, not the dog! If that had not been a low voltage cable he was destroying, the puppy would have learned a painful lesson. But fortunately for both of us, it did him no damage and was easily repaired.



John VA7XB took the first shift on CW from 8 until 10 am. 20m was open but running at full power did not bring forth a lot of responders, with long waits between returns to our CQ. At 10 am, Jan VA7VJ picked it up first on 20m then on 15m, but with the same results. When Alex VE7ADA arrived at noon, we switched to 20 m SSB and then the activity picked up dramatically. From then on until 4 pm it was steady pileups for Alex - 435 confirmed during his 4 hours; fortunately, Alex is competent in working through pileups and handled them with ease.

Alex VE7ADA



Heinz VA7AQ planned to operate after Alex but was unable to make it through the snow. During the evening John VA7XB moved to 40m SSB and found further activity. At 8 pm it was over.

Lesson #2:

Running high power on SSB brings forth many responders who can hear us, but they may not be heard well at this end. Dealing with multiple stations simultaneously responding to a CQ just above the background noise level is difficult even for an experienced operator

with good hearing (which I'm not), so I had to give up after a while.

Many thanks to Jan and Alex for braving the icy roads to help out with our effort.

~ John VA7XB

Operator	CW	LSB	USB	Total
VA7VJ	26	0	0	26
VA7XB	62	10	4	76
VE7ADA	0	0	435	435
Total	88	10	439	537



Jan VA7VJ



John VA7XB

2017 Burnaby Amateur Radio Club Annual Swap Meet

Sunday March 05 2017

Queensborough Community Centre, 920 Ewan Avenue, New Westminster

Snack shop: Coffee, hot dogs, do-nuts.

Free Parking, Limited handicapped Parking. Arrive early.

Door Prize: ICOM 2m handheld FM transceiver.

Raffle Prize: ICOM 65W 2m FM mobile transceiver.

Cost: \$6.00 at the door per person. Children under 12 years: free

Doors Open—Dealers 8:30am, Sellers 9:00am, and Buyers 10:00am to 1:00pm

Tables are priced at \$25.00 each. This includes one seller. If you are sharing a table, add \$6.00 per additional person. We require the names and call signs of all vendors for our records. All table Rentals must be prepaid .

Please contact Lou Beaubien VE7CGE to order tables, loucge@telus.net Phone 604.291.1569



March 2017



The SEPAR Report

Roger Andrews VA7VH

Is Amateur Radio Still a Useful Tool in an Emergency or Disaster?

I recently had a conversation with an amateur radio operator that claimed to also have considerable experience with a fire department as an on site commander in charge of 100 or more people. The conversation directed itself to amateur radio and it's usefulness as an emergency tool during disasters. It was his opinion that it was not useful, and that we will never truly be used for communications. I strongly disagree!

I worked in an emergency service and I still have friends that work in the emergency services. I am regularly reminded by their stories to me of how unprepared the crew members often feel. I know from my experience with BCAS (BC Ambulance Service), and talking with members still working in the ambulance service, that E-Comm isn't perfect. On New Year's Eve BCAS put a senior paramedic at an E-Comm station to act as a liaison between E-Comm and BCAS. For clarification you should know that BCAS uses the E-Comm radio network but is not dispatched out of the E-Comm building. Back to the story - the paramedic had all the passwords he needed to log into the E-Comm system but the terminal he was at was blind and he couldn't connect to

either service to see the calls. He called the Tech line and supervisors several times. To his surprise the Tech person said that the position he was at didn't have any equipment at it, which of course, it did. He was told by tech support that his situation was a priority and they would have it fixed shortly. He sat there for 12 hours waiting for someone from either service to work it out but he remained at a blind terminal the whole time. So with this stories, and others I have heard, it makes me ask myself - Is E-Comm as bullet-proof as we are told? The paramedic's purpose was to share information from his service with the police services. He sat there all night waiting for someone to get the terminal he was at to work, or to bring in equipment to make his job possible. 12 hours later he went home having shared no information with any other service. Maybe even worse, he had no idea what was happening in his service either.

This story happened during a fairly regular night of work. What if there had been an earthquake or other disaster that damaged equipment. Crews and support staff may not be able to get to where they need to be and knowing that a simple problem can't be solved on a mostly normal night, what can we expect during a disaster? In the old days, a scanner set to listen to the other agency, placed on the desk of the Charge Dispatcher of both agencies would have provided accurate up to date information at no labour cost and without much more technical support than reading the user manual to set up the frequencies. This incident and the discussion with the Ham operator made me think about Vancouver's emergency radio system. Is being as high tech as it is a good thing, or a hindrance in a disaster. It used to be that a radio system was a radio system, but over the past decade and a half,



Is E-Comm as bullet-proof as we are told?



Surrey Emergency Program Amateur Radio

it's turned into a computer that just happens to transmit radio waves.

I've never been a fan of encrypted digital radio systems for essential services for the following reasons:

- If the encryption/decryption goes down then the service cannot communicate adequately.
- Outside services cannot monitor each other. This was a significant loss to paramedics in the Downtown Eastside where calls were often heard on our (Paramedic's) police scanners, minutes before they were dispatched to us as the Ambulance crew.
- All the operation of the radios are centralized. Two radios cannot communicate with each other (I haven't forgotten about "talk-around".) without the main computer system, just like my cellphone cannot call yours without a connection to the tower and then to the system.
- When not on the repeater (talk-around mode) the range on these 800 MHz, 3 watt radios is pathetic. I've spoken to a good number of Law Enforcement officers in the US that use these systems regularly, as well as well as those that have had network difficulties. The general feeling is, "let the madness end, can we go back to the old way." - as one LEO put it!

So what happens when we have an earthquake and one of the E-Comm area controllers goes down because the tower is knocked offline. The E-Comm radios are not high power devices and a whole area would go dark (at the very least). Sure, there are backups. But disasters are by definition a thing that happens which is out of our control. I wondered how others might feel about the stability of the system as it is now, so I asked around. We have a SEPAR member that is quite familiar with E-Comm. I spoke to John - VE7TI who was with the VPD in Emergency Planning and in charge of the Communications Section. For several of the last years before he retired, he

worked out of E-Comm and ran the Vancouver EOC for several police operations such as the fireworks etc., and this is what he had to say:

"You are also correct about E-Comm. Even though there are fail-safe mechanisms, there is a limited ability to operate simplex, once a few dishes get out of alignment or fall down (as they surely will in a big shaker) the system will be severely impaired. And 9-1-1 systems can also fail. E-Comm minimizes this possibility to preserve faith in the system... but it can happen."

The other issue is staffing. In a major emergency, most staff will have problems commuting. 90% of Emergency staff, techs included, lived outside of Vancouver. In the VPD we looked at it one year and 96% of our staff lived outside the city, many across a body of water. So, in an emergency, how do you get staff in... if they're willing to come? Because in New Orleans, they had trouble getting emergency services people to come to work until they were certain their own families were safe."

In the 2001 Seattle earthquake, Amateur Radio provided vitally important damage reports. These reports came so quickly that it propagated through the Ham world well in advance of the media or official reports.

And if we need further validation of our potential in a disaster we need only look to the recent news that has come out of the California town of Oroville. This February 12, 2017. The tallest dam in the USA began to fail, threatening not only the people of the town but the future existence of the town. 200,000 residents were evacuated, and their amateur radio emergency system was deployed and actively used. Fortunately the dam did not completely breach and for the most part the disaster was averted. Amateur radio would have been vital and in fact, likely the only operating wide area communication mode. With a town completely evacuated, there is no

infrastructure. Dispatch centres (like E-Comm) rely on infrastructure.

E-Comm's website says that the system is "Earthquake resistant". It doesn't say earthquake proof. So, are we obsolete in this age of high tech dispatch systems? Real world evidence says very clearly, No! We are very much of an asset. In fact, maybe even more so than we were 20 years ago. Be proud of what we can do, don't let anyone tell you we are not useful. Recognize our solid place in the Emergency/Disaster Operations role.

Remember that SEPAR conducts 2 weekly Nets:

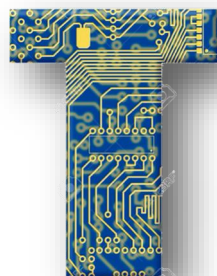
Every [Tuesday evening at 1930 hrs \(7:30pm PDT\)](#) we start a ½ hour NET on a local repeater, provided by the Surrey Amateur Radio Club (SARC) on 147.360 MHz +600kHz and a tone of 110.9. There may be a simplex test or a test NTS message transmitted during the NET at the Net controllers discretion. This is an excellent opportunity to practice sending and receiving this form of messaging. Besides, it adds a little spice to the regular check-ins on the net. Please join us. NTS Radiograms can be found on the SEPAR website.

[Thursday nights at 19:30 hours](#), we only provide Simplex operations starting on frequency 146.550 and changing frequencies and bands for further signal checking. During these tests, we encourage those with mobile or hand held capabilities to try different locations each time to become more knowledgeable as to what to expect in a real disaster. We are unable to predict where we will be located when we are needed. Additional training sessions and practice exercises are scheduled throughout the year including participation with other departments and agencies.

73s

~ Roger Andrews
SEPAR Secretary

March 2017

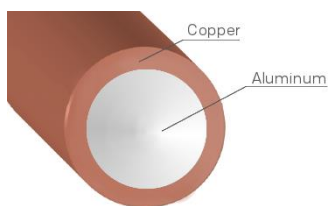


Tech Topics

Rick Fearn, K6VE

Copper Clad Aluminum Wire

Recognize CCA wire by its silver cross-section, even though the outside will have a copper colour.



Because of the increasing price of copper, Copper Clad Aluminum (CCA) wire is becoming more common. Its particularly attractive to the cost conscious ham because of its relatively low price as compared to pure copper wire. Much CCA wire seems to be coming from outside the country, where the process of bonding copper to aluminum or steel in increasingly thinner outer layers has been perfected. But there are risks in using CCA wire that the Amateur Radio community should be aware of.

The key is in the 'skin' effect. Skin effect you may recall is the phenomenon that causes electrons to flow on the outer circumference of a wire rather than within its core. Well, "skin effect" only takes place when wire is used at high frequencies, and not at DC (direct current) potential. Even in Cat 5 and 6 cables, the copper clad cable, especially when used over greater distances, will suffer data loss which will result in slower data speeds.

So, what are the consequences of using copper clad wire versus pure copper conductors? First of all, OFC (copper) wire offers much improved corrosion resistance over CCA (copper clad aluminum) wire.

The second, and most important difference is that the resistance of CCA wire over copper is significantly greater. It's estimated that the gauge of CCA wire must be at least two gauge sizes higher

to achieve the same transfer of energy. Saying it another way, if you're using 12 gauge 100% copper wire to power your station, you'd need about an 8 gauge CCA cable to achieve the same transfer of energy. Then too, the tensile strength of aluminum is not as great as copper. Thus, your copper clad aluminum wire will break off quite easily when compared to pure copper conductors.

The gauge size difference depends upon the thickness of the layer of copper that's plated on to the aluminum core. Obviously, the thinner the coating of copper, the greater the cable loss per foot. Recall in the beginning of part one of this two part article, I was surprised when I attempted to solder to my copper clad aluminum wire. The copper coating was so thin that it burned off quickly, leaving me with an aluminum wire which would not "take" solder. The less copper that's used, theoretically the less expensive the cable will be. So, frugal hams seeking a bargain will undoubtedly be attracted to the lowest per foot of cable price, which as we've discussed above, may very well have the greatest loss and fastest deterioration factors.

In summary, my advice is to stay away from CCA cable, no matter it's application. You've been warned!

~ Rick Fearn, K6VE



Surrey Amateur Radio Club

Industry Canada
BASIC AMATEUR RADIO
Qualification Course

What Can I Do With My Radio License?

- Long range communications anywhere for free without commercial infrastructure
- Enhance your personal and your community's preparedness in an emergency
- Use satellite communication to speak around the world, perhaps even to an astronaut
- Use a computer, smartphone or tablet for free worldwide digital communications
- Participate in 'Radio Sports' like contesting and Fox Hunting
- Practice an exciting hobby

Learn In A Professional Setting
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Practical Demonstrations
Technical Knowledge Not Required

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Includes Course Manual

Surrey Amateur Radio Club
For more information on the course visit
www.ve7sar.net or contact
sarc@ve7sar.net

Course starts March 14, 2017
8 sessions on Tuesdays 6:30pm—9:30pm
plus one optional Saturday workshop
Surrey Fire Training Centre
14901 64 Avenue, Surrey, BC

March 2017



QRM

...from the Editor's Shack

*Do you have a photo or bit of club news to share?
An Interesting link?*

*Something to sell or something you are looking for?
eMail it to [SARCcommunicator @ outlook.com](mailto:SARCcommunicator@outlook.com) for inclusion in this column.*

Field Day is Coming up Soon

Your Input (and Your Help) are Needed

To assist you getting to the 'right' person, we have some new contact addresses:

president@ve7sar.net
vicepresident@ve7sar.net
secretary@ve7sar.net
treasurer@ve7sar.net
communicator@ve7sar.net
webmaster@ve7sar.net
repeater@ve7sar.net
membership@ve7sar.net
directors@ve7sar.net

Field Day is the biggest day of the year for amateur radio clubs. This year it is on the weekend of June 24/25. Several members have agreed to form the nucleus of the FD planning committee, but more help is needed. Why? Because it's a huge job and if we are to do this properly, we need to spread to work around and not leave it to the same few. The committee has met once to discuss the fundamental concepts including:

1. Should we be going for a win, or for the best experience for all our members?
2. Will FD be held in the "field" or at the OTC?
3. If in the field, where?
4. What entry category of station should we operate?
5. How many of the potential bonus point activities will we attempt?

No. #1 and 2 are certainly the first questions to be answered before all others.

We have done the "win" option in past years with notable success but that objective may exclude members who are not up to the "ace" performance standard but still want to share the

experience. Regarding location, some will argue that an event at the OTC is not in the true spirit of "Field" Day and there is certainly validity to this position. Others will argue that the club does not have a sufficiently large number of volunteers willing to devote many hours and weeks of personal time to organizing and carrying out a credible "field" event. This is becoming more of a problem every year as we have fewer seasoned members with the required technical skills to guide the effort. It is indisputable that FD at the OTC is certainly easier to plan and carry off successfully, but it does not carry the same weight as a true emergency exercise, not is there the same opportunity to engage the public and government officials or, indeed, test our ability to set up and operate in an emergency.

You will be asked for your opinion regarding these matters at the March 8th meeting. However... before offering an opinion that FD should be held in the "field" for others to organize or should be to a "win" standard, be prepared to step up and offer your time and/or expertise to the planning committee's work.



Page 13—News You Can Lose

The Lighter Side of Amateur Radio

Valentine's Gift A 'Big Hit' For Radio Operator



By WBØRUR, on the scene

NACODOCHES, West Virginia — Mr. Harold “Butch” Crutchfield of Upper Combover County is nursing a gunshot wound to the upper thigh, after presenting his wife with an outstanding Valentine’s Day present: an Alpha 9500 amplifier!

heart box “She’d been hinting around that she wanted something really special this year,” says the 63-year-old civil engineer. “So I thought about it for a while... and chose the amp. It’s a great piece of equipment!”

Crutchfield, a ham radio operator since 1988, ordered the amplifier online. It was delivered just days before the traditional “love-bird” holiday.

“I didn’t even have a chance to gift wrap it before she ripped into the packaging. We’ve been married for 32 years,” says

Crutchfield. “And I’ve got to be honest. I’m about out of creative gift-giving

According to a spokesman for the local ham radio club, Marti Jane Crutchfield (the ham’s wife) was so excited upon un-boxing the amp that she retrieved her husband’s shotgun to fire celebratory gunshots into the air.

Apparently one of the blasts caught Butch in the upper thigh.

“I’ll be alright eventually,” he says philosophically. “But I won’t be climbing my tower anytime soon, that’s for sure.”

A year ago, Mr. Crutchfield presented his wife with an RG -58 coax bouquet, complete with silver and gold Teflon connectors, which he says “shimmered like my wife’s eyes.”

Local hams may recall the freak accident last year, when the coax bouquet twisted around Crutchfield’s left forearm and broke his fall from the 2nd story balcony.

~Ham Hijinks



March 2017



Back to Basics

John Schouten VE7TI

From The Basic Question Bank

The ICAO developed this system in the 1950s in order to account for discrepancies that might arise in communications as a result of multiple alphabet naming systems coexisting in different places and organizations.

B-002-002-001

To make your call sign better understood when using voice transmissions, what should you do?

- A. Talk louder
- B. Turn up your microphone gain
- C. Use Standard International Phonetics for each letter of your call sign
- D. Use any words which start with the same letters as your call sign for each letter of your call

To make it easier to decipher radio phone transmission from interference, the use of phonetics has been adopted as a standard.

The International Radiotelephony Spelling Alphabet, commonly known as the ICAO phonetic alphabet, sometimes called the NATO alphabet or spelling alphabet and the ITU radiotelephonic or phonetic alphabet, is the most widely used radiotelephonic spelling alphabet. Although often called "phonetic

alphabets", spelling alphabets are not associated with phonetic transcription systems such as the International Phonetic Alphabet. Instead, the International Civil Aviation Organization (ICAO)

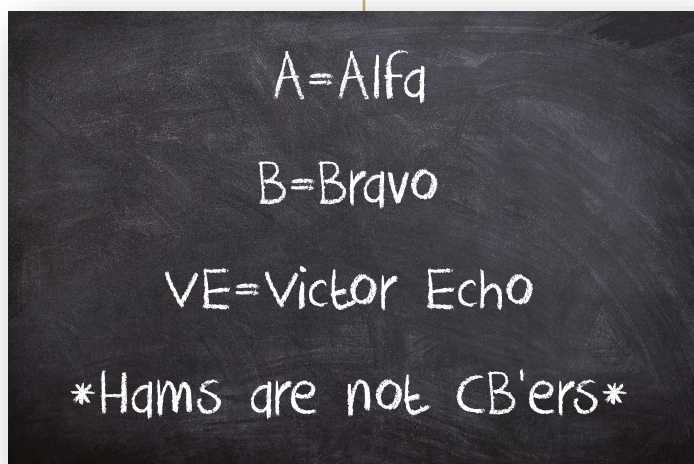
alphabet assigned codewords acrophonically to the letters of the English alphabet, so that critical combinations of letters and numbers can be pronounced and understood by those who exchange voice messages by radio or telephone regardless of language barriers or the quality of the communication channel.

The 26 code words in the NATO phonetic alphabet are assigned to the 26 letters of the English alphabet in alphabetical order as follows: Alfa, Bravo, Charlie, Delta, Echo, Foxtrot, Golf, Hotel, India, Juliet, Kilo, Lima, Mike, November, Oscar, Papa, Quebec, Romeo, Sierra, Tango, Uniform, Victor, Whiskey, X-ray, Yankee, Zulu.

International adoption

After the phonetic alphabet was developed by the International Civil Aviation Organization (ICAO) it was adopted by many other international and national organizations, including the North Atlantic Treaty Organization (NATO), the International Telecommunication Union (ITU), the International Maritime Organization (IMO), the American Federal Aviation Administration (FAA), the Alliance for Telecommunications Industry Solutions (ATIS), and the International Amateur Radio Union (IARU).

It is a subset of the much older International Code of Signals (INTERCO), which originally included visual signals by flags or flashing light, sound signals by whistle, siren, foghorn, or bell, as well as one, two, or three letter codes for many phrases. The same alphabetic code words are used by all agencies, but each agency



chooses one of two different sets of numeric code words. NATO uses the regular English numeric words (Zero, One, with some alternative pronunciations), whereas the IMO provides for compound numeric words (Nadazero, Unaone, Bissotwo...). In practice these are used very rarely, as they frequently result in confusion between speakers of different languages.

NATO

An alternative name for the ICAO spelling alphabet, "NATO phonetic alphabet," exists because it appears in Allied Tactical Publication ATP-1, Volume II: Allied Maritime Signal and Maneuvering Book used by all allied navies of NATO, which adopted a modified form of the International Code of Signals. Because the latter allows messages to be spelled via flags or Morse code, it naturally named the code words used to spell out messages by voice its "phonetic alphabet". The name NATO phonetic alphabet became widespread because the signals used to facilitate the naval communications and tactics of NATO have become global. However, ATP-1 is marked NATO Confidential (or the lower NATO Restricted) so it is not available publicly. Nevertheless, a NATO unclassified version of the document is provided to foreign, even hostile, militaries, even though they are not allowed to make it available publicly. The spelling alphabet is now also defined in other unclassified international military documents. The NATO alphabet appeared in some United States Air Force Europe publications during the Cold War. A particular example was the Ramstein Air Base, Telephone Directory published between 1969 and 1973 (currently out of print). The American and NATO versions had differences and the translation was provided as a convenience. Differences included Alfa, Bravo and Able, Baker for the first two letters.

History

The ICAO developed this system in the 1950s in order to account for discrepancies that might arise in communications as a result of multiple alphabet naming systems coexisting in different places and organizations.

In the official version of the alphabet, the non-English spellings Alfa and Juliet are used. Alfa is spelled with an f as it is in most European languages because the English and French spelling alpha would not be pronounced properly by native speakers of some other languages - who may not know that ph should be pronounced as f. Juliet is spelled with a tt for French speakers, because they may otherwise treat a single final t as silent. In some English versions of the alphabet, one or both of these may have their standard English spelling.

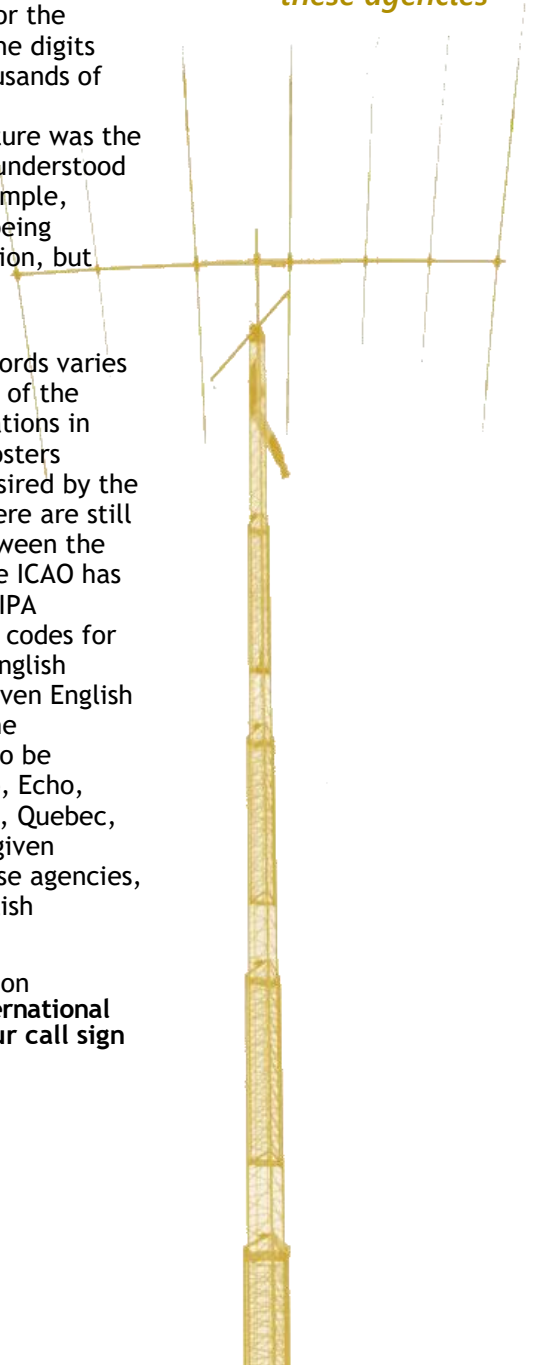
The final choice of code words for the letters of the alphabet and for the digits was made after hundreds of thousands of comprehension tests involving 31 nationalities. The qualifying feature was the likelihood of a code word being understood in the context of others. For example, football has a higher chance of being understood than foxtrot in isolation, but foxtrot is superior in extended communication.

The pronunciation of the code words varies according to the language habits of the speaker. To eliminate wide variations in pronunciation, recordings and posters illustrating the pronunciation desired by the ICAO are available. However, there are still differences in pronunciation between the ICAO and other agencies, and the ICAO has conflicting Roman-alphabet and IPA transcriptions. Also, although all codes for the letters of the alphabet are English words, they are not in general given English pronunciations. Assuming that the transcriptions are not intended to be precise, only 11 of the 26—Bravo, Echo, Hotel, Juliet(t), Kilo, Mike, Papa, Quebec, Romeo, Whiskey, and Zulu—are given English pronunciations by all these agencies, though not always the same English pronunciations.

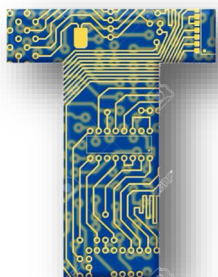
The correct answer to our question therefore is **C. Use Standard International Phonetics for each letter of your call sign**

~ John VE7TI

*...only 11 of the 26—
Bravo, Echo, Hotel,
Juliet(t), Kilo, Mike,
Papa, Quebec, Romeo,
Whiskey, and Zulu—
are given English
pronunciations by all
these agencies*



March 2017



Tech Topics

Jim Brown K9YC

Build Contesting Scores by Killing Receive Noise - Part 2

"Noise radiates from sources on wires that are connected to noise sources, and enters our receivers via our antennas."

Part One of this article appeared in the February 2017 Communicator. Figures 1-7 reference in this article are in that issue.

Evaluating Equipment For Noise: When someone tells you that XYZ equipment produces no noise on the ham bands because he can't hear any noise in his radio, should you believe that the equipment is clean? NO! The equipment may be noisy but he doesn't hear it because it is being covered by other noise from the neighborhood. Figs 8 and 9 compare the daytime 80M spectra at K6GFJ in a San Jose residential neighborhood and K9YC 30 miles to the south in the Santa Cruz Mountains. The difference in the noise floor is 10 dB. And it's certainly not dead quiet in the mountains, either - everything on the displays from both QTHs is noise from either switching power supplies or other electronic

Proximity to Antennas Is What Matters:

Noise radiates from sources on wires that are connected to noise sources, and enters our receivers via our *antennas*. My SteppIR that's up 120 ft and is 200 ft from the shack doesn't hear much noise from the shack, but the 160M Tee vertical only 25 ft from the operating position does. When someone tells you that a particular model of internet router or video monitor sits next to his power amp and there's no RFI, ask him how far it is from his antennas, not from his radio.

An Exception - Magnetically Coupled Noise:

When a noise source produces strong magnetic fields, it can couple noise into equipment in close physical proximity to the victim (see Part One). Noise is coupled via the magnetic field to any circuit loop nearby, and to any victim equipment that

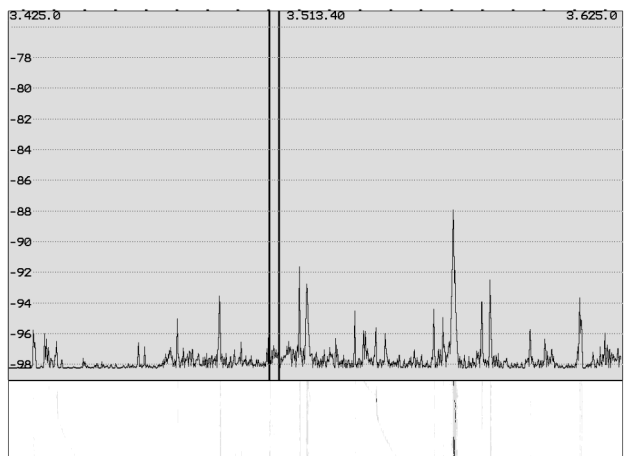


Fig 8 - 80M at K6GFJ - Noise floor -98 dBm

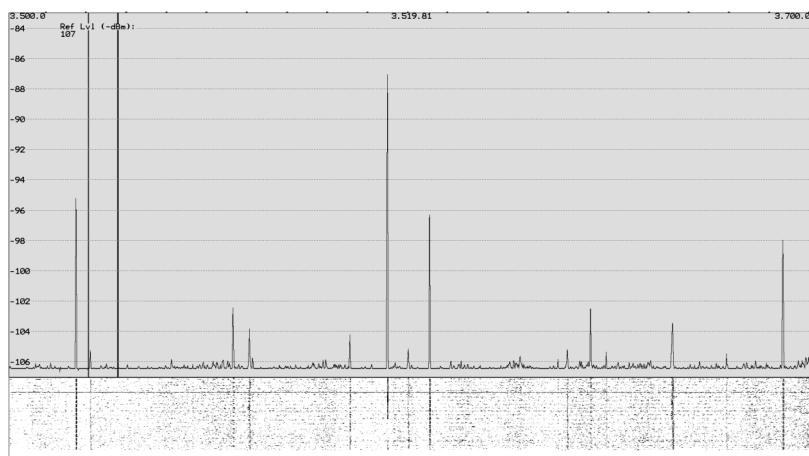


Fig 9 - 80M at K9YC - Noise floor -108 dBm

has a similar circuit layout problem. Magnetic coupling dominates over electric field and electromagnetic field coupling in the near field of the source. The solutions to magnetically coupled noise are

- 1) to reduce the area of the loop carrying the noise current,
- 2) reduce the area of the loop in the victim circuit, and
- 3) separate the source and victim by as much distance as possible. In general, this means using twisted pair or coax for all signal wiring and running it in close proximity to bonding conductors between the equipment it interconnects (because the bonding and the signal wiring forms a magnetic loop).

Several years ago, ON4WW put up an excellent web page with more than twenty case histories documenting the successful pursuit of a variety of RF noise. It's well worth a read.

<http://www.on4ww.be/emi-rfi.html>

Issues With Specific Product Types

Low Voltage Lighting:

This generic type consists of any lamps and bulbs that run on DC voltage, including those in most architectural lighting fixtures, many track lights, and LED lighting. Incandescent types CAN run on an ordinary transformer, but transformers large enough to power them don't fit in the electrical enclosures within walls or ceilings, so switch-mode power supplies are almost universally used. All that I have seen are unbranded, unlabeled, noisy pigs. They are sold by electrical supply houses, where they are called "electronic transformers."

Track lighting now comes in several forms. The track itself can carry "line voltage" (120VAC) or low voltage (12 or 24VDC). Track that carries low voltage is fed by a 24V supply, which could be a transformer (quiet), but is usually an SMPS (noisy). Fixtures for "line voltage" track can utilize 120VAC incandescent bulbs, in which case they will be as quiet as any

other incandescent bulb. Sadly, over the last decade or so, manufacturers have gradually shifted to low voltage fixtures that use a switch-mode power supply built into the base of each lamp holder so that it can be connected to a line voltage track. Any noise produced by those supplies will be radiated by the wiring within the track and the wiring feeding the track. The only practical place to choke these noise sources is where external wiring feeds the track, but the parallel wires within the track are efficient radiators.

LED Lighting:

LEDs are very efficient, requiring relatively low values of DC voltage and current for a lot of light, but there still must be a DC power supply somewhere. For screw-in 120V LED replacements, the DC power supply is built into the base of the bulb. Any noise produced will be radiated by the AC line. To suppress that noise, the line should be choked as close as practical to the bulb. A noisy outboard supply, if there is one, should be choked at its input and output terminals. Several years ago, ARRL tested a broad selection of LED screw-in bulb replacements and found them relatively clean. The bad news is that things change when products become a commodity - local hams report that off-brand LED bulbs from the local big box store were quite noisy, while Phillips bulbs, among those ARRL reviewed, were relatively quiet. My advice - try a few in fixtures that are close to antennas and see if you hear them. And if they're noisy, return them for full credit, and make sure you tell the vendor that "they made noise in your radio."

Faced with noisy low voltage lighting, I'd still look for LED replacements - their much lower current requirements could make it practical to replace the existing noisy supply with a quiet linear supply that's small enough to fit in the available space. I'm lighting my shack with five LED strips that I bought at Pacificon from Wired Electronics. The combined load is about 1.25A from the 12V system that runs my radios. The shift to LED lighting has already produced some LED lamps that are



manufacturers have gradually shifted to low voltage fixtures that use a switch-mode power supply

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Faced with noisy low voltage lighting, I'd still look for LED replacements...

direct replacements for existing fixtures, and that trend is certain to continue.

Grow Lights can be a very powerful source of RF noise that can be heard a half mile away! These 600 - 1,000 W sodium or metal halide lamps run from ballasts that include switching power supplies in the range of 50-75 kHz. None are certified to Part 15 or 18 of FCC Rules. Wiring between the ballast and the lamp is usually fairly long and can form a large loop, so is rather efficient at ham frequencies both as an antenna and as a magnetic loop.

Tom Thompson, W0IVJ, and Larry Banks, W0QE, have researched these lamps extensively, and Tom has developed an effective filter which is designed to be applied between the ballast and the lamp. Tom found that a filter on the power line side of the ballast was less effective. A commercial version of Tom's filter, built by W7LOZ, is available at <http://growershous.com/revolution-ballast-emi-filter-reduce-rf-emi>

A report on Tom and Larry's work, including a schematic of the filter, is at <http://tomthompson.com/radio/GrowLight/GrowLightBallastFilter.html> Also, there's recent good news from W0IVJ - some ballast manufacturers are starting to place the ballast on the lamp hood, which reduces the loop area, reducing the both the magnetic field and the size of the antenna that can radiate the noise. In addition, Tom thinks that the Galaxy Grow Amp model 90220 may pass Part 18, but the extent to which this kills emissions will likely depend strongly on the loop area of the connection to the lamp.

Tom's filter suppresses only noise radiated by wiring on the lamp side of the ballast. That may be sufficient for many installations, especially where noise is at 5 MHz and above. In more severe cases, or where RFI is present below 5 MHz, a common mode choke on the power line side of the ballast may also be required. Follow the recommendations in the Choke Cookbook in <http://k9yc.com/RFI-Ham.pdf> for small diameter coax (RG8X) for RFI in the frequency range where you hear the noise, running the line cord through the choke. W0QE shows a very different filter design on his website. http://www.w0qe.com/RF_Interference/grow_light_electronic_ballasts.html

Switch Mode Power Supplies: If you must use an SMPS, plan on adding suppression to it. Start with common mode chokes on both the 120VAC and low voltage DC lines for the frequency range(s) where you hear noise. Capacitors across the DC output terminals and the AC input terminals can also help. Select capacitors for low ESR (equivalent series resistance) at the frequency of interest and on the AC line side, use only type X1, X2, Y1 and Y2 capacitors, which are specifically rated for AC line use and designed to withstand the 3-6 kV spikes that can occur on power wiring. Choose this capacitor carefully - if it fails, it could catch on fire!

SMPS units tend to be noisiest at lower frequencies, especially on 160M. Fig 10 shows a choke wound with 18 turns of #16-2 "zip cord" on a 2.4-in o.d. #31 Fair-Rite toroid. It is intended to provide strong attenuation of SMPS noise on the 80 and 160M bands. It can safely be inserted in circuits carrying up to about 12A of AC or DC current without danger of overheating. This short length of #16 (about 4 ft) does not increase resistance enough to affect charging current.



Fig 10 - A 80/160M Choke

DC-AC Inverters:

The Samlex PST-series of "pure sine wave" DC-AC inverters carry an FCC Part 15 Class B rating for RF noise, and are relatively quiet, but may not be quiet enough for any given installation, depending on proximity to antennas for the bands you want to operate. (Part 15 Class A is a much looser specification for industrial applications, and allows 20 dB higher noise levels than Class B, which is for residential use.) The Pure Sine Wave inverter in Fig

10 carries FCC Part 15 Class B certification, but had to extensively choked to kill radiated noise. The smallest clamp-ons are for 2M; these and the three smaller multi-turn chokes (0.75-in i.d.) were sufficient when powering the logging computer for our 7QP mobile operation. As an experiment, the two larger (1-in i.d.) chokes (above the unit in Fig 11) were added in an attempt to suppress RFI to the 160M vertical 25 ft from my shack, and were not nearly enough, so I wound the choke shown in Fig 10, which helped.

Uninterruptable Power Supplies (UPS) come in two basic types: *On-line* types are always regenerating power, while *Standby* units monitor the AC line and regenerate power only when AC power fails. Both types include batteries to provide the power when power fails, a DC power supply to keep those batteries charged, and a DC-AC inverter that operates when the unit is producing AC power. If the DC power supply is an SMPS, it will likely produce RF noise while charging the battery. All of the comments about DC-AC Inverters and SMPS apply equally to UPS units.

Variable Speed Motor Controllers are often used in furnaces and HVAC systems. These controllers are notoriously noisy for at least three reasons. First, they consist of an SMPS, the DC output of which is then pulsed at variable width and speed to control the speed of a motor. Both of those pulses are rich in harmonics, and they are radiated by wiring both internal and external to the unit. This radiation tends to be quite strong because the designers have failed to consider the impact of circuit layout on noise. Thus, loop area tends to be quite large, which increases antenna action and greatly increases the magnetic field produced by the noise current. Variable speed controllers are also widely used for motors in elevators and geothermal systems where both motor currents and loop areas are even greater.

Solutions include rewiring circuits with large loop area carrying motor current with twisted pair. Some product manufacturers sell optional filters to prevent noise from being conducted onto the power line, but that does not prevent that interior wiring from radiating.

N9TF reports electronic noise in the range of 20-23 MHz spaced about 17 kHz. The source is a Samsung washing machine, and lasts as long as the wash cycle. Peaks on 15M are 1820 dB above his noise level. Gene provided these videos of this noise, that are currently at the links below. k9yc.com/SamsungWasher1.mp4 and k9yc.com/SamsungWasher2.mp4



Fig 11 - 12VDC to 120VAC 1A Inverter with Required RF Filtering

Plasma TVs produce strong RFI that extends up to at least the 12M band, and it is just about impossible to suppress. The best solution is to replace it with an LCD model. The noise is produced by the current inside the display structure that it takes to light up each pixel turning on and off, and the magnetic and electromagnetic fields produced. In other words, the noise is *not* radiated by external wiring, but is radiated by the display itself. There's no way to suppress it short of major redesign of the display to either shield it or confine the fields by means of microstrip or stripline construction. Chokes on external wiring will have no effect at all on noise radiated by the currents within the display. Thankfully, plasma TVs are no longer manufactured, but existing units will continue to be used for years.

Typical Plasma TV Noise Spectra are shown on the next page in Figs 12 and 13 (K6GFJ) and Fig 14 (K7PI). K6GFJ's data is from his K3/P3/SVGA fed by a low dipole, and looking at his own NEC PlasmaSync 50MP2 TV. The bottom of each of the amplitude displays is the noise level at Ross's QTH in a San Jose residential neighborhood. Fig 8, from K7PI's SDR, shows a wider spectrum for his neighbor's

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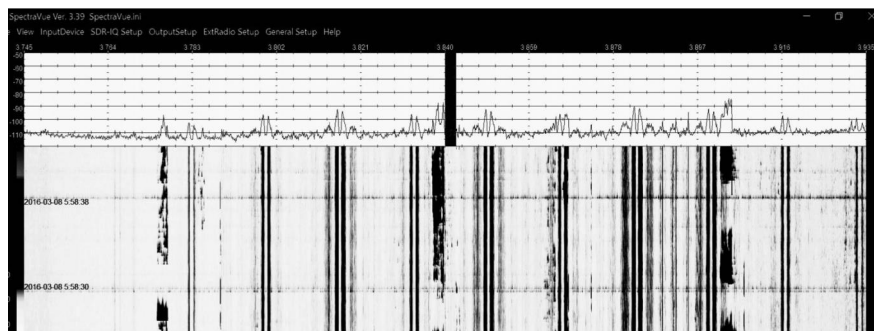


Fig 14 - A Neighbor's Plasma TV at K7PI - 3,754 kHz - 3,935 kHz, 10dB/div

plasma TV. Note that the spectra will be strongly dependent on which of the dozen or so common DTV video standard signals are being viewed at the time. There's more spectral data for plasma TV RFI at k9yc.com/publish.htm

There can, of course, be other noise radiated by the unit - a switching power supply and other circuitry separate from the display itself. These components would most likely be radiated by cables connected to the unit and can be suppressed with chokes.

Wired Ethernet RFI on the HF bands (the carriers around 14,030, 21,052, and the low end of 10M and 6M) can be suppressed by choking every cable connected to the Ethernet switch. Both ends of the cable are potential noise sources; cables that are shorter than about $\lambda/10$ at the frequency of interference can be choked in the middle with a single choke. Longer

cables should be choked at both ends. Don't forget to choke the power supply cable. As noted earlier, you'll hear both your own carriers and those of your neighbors; to identify yours, kill power to the Ethernet switch and note which carrier disappears. Gauge your success on the reduction in strength of your carrier in each group; to kill the carriers from your neighbors you'll have to choke their cables. When setting up a network, always try to avoid the use of wired Ethernet; instead use WiFi if it will work reliably for your installation.

VDSL and Cable Modem UpLink Leakage in the range of 3.7 - 5 MHz shown in Fig 2 of Part One may be radiated by wires connected to modem itself or from the telephone or CATV company's wiring between homes. WA7JHZ and W0IVJ have documented this problem with spectrum measurements of the common mode signal on coax carrying CenturyLink and Comcast systems in Idaho and Colorado. It should be possible to suppress leakage from the modem with a 6-7 turn choke on each cable wound around a 1-inch long #31 clamp-on, but so far, cable and telcos have stonewalled. This would be a good issue for ARRL to address.

Computers: Some are RF-quiet, but many radiate RF from internal wiring, and from wiring for power and connected accessories. Some are quiet at HF but

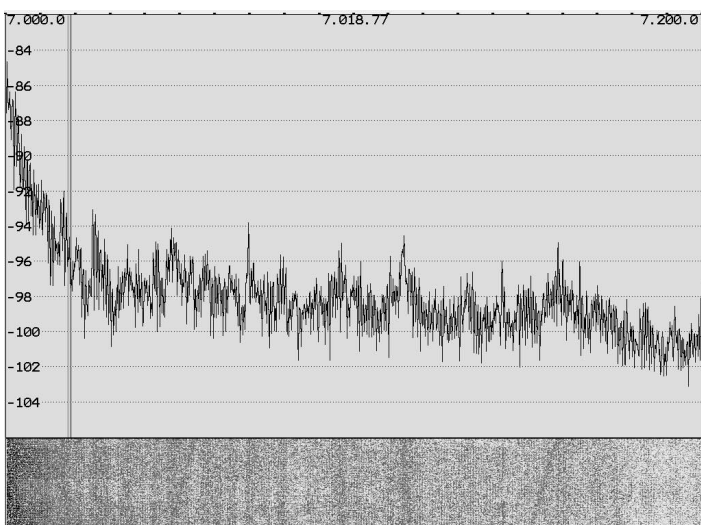


Fig 12: Plasma TV, 7 - 7.2 MHz

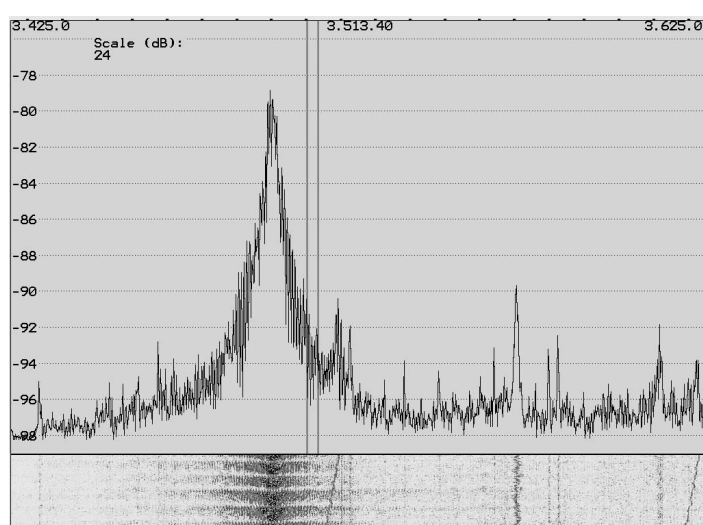


Fig 13: Plasma TV, 3.425 - 3.625 MHz

noisy at VHF. If a computer is noisy, choke all cables connected to it.

Some *Computer Video Monitors* are noisy, some are not. Choke both video and power cables on the noisy ones. Some cannot be suppressed - W4UAT gave me a Samsung with "touch" controls that he couldn't use because it went nuts when he keyed a radio feeding a nearby antenna. Nothing I tried could kill the noise it made in my receiver, nor prevent it from turning flips when I transmitted. Not all Samsung monitors are noisy - I've replaced all the monitors in my home and shack with 24-in Samsung models sold with outboard 14VDC switching power supplies, which I run from float-charged 12V batteries (see Part One.)

USB Powered Equipment like USB sound cards and computer extension speakers often includes a switch-mode power supply to convert the 5V USB voltage to that that the powered unit can more effectively use. Add equipment like this to the list of potential noise sources, and treat them like any other - choke the cable(s), and if that doesn't kill the noise, replace the noisy product. W6GJB reports that noise from a pair of USB-powered speakers radiated not only on their own USB cable, but also on every cable connected to the computer!

Noisy Doorbell Transformers, often buried in the walls, can be nasty sources of impulse noise. WX5L reports that "the older type doorbell transformer has a safety feature built in. A thermistor monitors the heat in the windings. If it detects overheating it, it opens a relay to disconnect power so it doesn't combust. But even with a normal situation this relay can become pitted and chatter away causing RFI." The defective transformer should be replaced with one that is UL or ETL listed. If the transformer is inaccessible but its AC wiring is accessible, it should be disconnected and an alternate doorbell system installed. Most building codes require that all wiring associated with the mains system (120 and/or 240VAC) must be accessible.

Solar Power Systems can be very strong noise sources as a result of poor design, poor installation, or both. The best charge current regulators are DC-DC converters, and most are noisy. DC - AC inverters that provide 120VAC are also often noise sources. Both charge and discharge circuits

carry large pulsed currents with strong harmonics; those harmonics will radiate if the current flows through large area magnetic loops. A large system with all wiring in steel conduit has the best chance of being quiet, *provided that the conduit is continuous and bonded to all equipment enclosures at both ends*. Solar power systems should always be wired with twisted pair. Genesun, a relatively new company makes a line of MPPT (the most efficient type) solar charger regulators for small systems that is quiet enough for nearly all installations (although I needed the choke of Fig 10 in mine to completely kill noise in a 160M vertical next to the panels). <https://genasun.com/products-store/mppt-solar-charge-controllers/> Most solar systems include DC to AC inverters, which as noted earlier are often noisy.

There has been a trend in recent years to solar panels with self-contained regulators and inverters; properly built and installed, these can greatly reduce the loop area and thus the noise. Because the power leaves the panel as 120VAC (or even 240V), wiring from the panel is usually in conduit. And because the output of the panel is at the higher line voltage, the current is much less than if it were at battery voltage. RF trash produced is directly related to current, so all of these factors can combine to result in less radiated noise if the units are well designed.

April 2016 QST includes a feature article on modern home solar power systems with respect to RF noise. There many good things about the article - a good discussion of overall system architectures in general and for this system in particular, recognition of the interconnection of solar panels and batteries as a magnetic loop, recommendation for the use of twisted pair for that loop with return circulating through the loop to minimize radiation and the loop area, recommendations that wiring be installed in steel conduit, and recommendations for the use of ferrite common mode chokes for suppression of noise currents. It also shows how much work it is to fix a bad system!

I have two problems with this article. First, the author, rather than searching out and buying a system that produces minimal RFI (or insisting that the vendor and/or manufacturer fix his RFI problems), instead buys a "bad" system and goes to



Wired Ethernet RFI on the HF bands (the carriers around 14,030, 21,052, and the low end of 10M and 6M) can be suppressed by choking every cable connected to the Ethernet switch

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Using A Spectrum Analyzer To Chase Noise (and DX)

We can maximize the visibility of signals (and man-made noise) with several important settings.

1. Set the analyzer for maximum averaging, and with repetition rate in the range of 100-250 msec. Averaging is a powerful signal analysis tool because it causes all random noise to average out to near zero, but signals are reinforced because they are coherent (i.e. not random).
2. Adjust reference level so that the bottom of the display is the level of the averaged "white" noise
3. Set the scale of the display so that the strongest signals fills most (but not all) of the height of the spectrum display.
4. Set the width (frequency span) wide enough to see any variation in noise with frequency. For example, many electronic noise sources repeat every 10-30 kHz.

When we've done this correctly, the bottom of the amplitude display will be the average of the white noise, and the waterfall will go to black anywhere there are no signals or electronic noise sources. Figs 1, 4, 8, 9, 12, and 13 illustrate this technique with an Elecraft P3, which allows frequency span to be adjusted over the range of 2,200 kHz. An important benefit of setting the analyzer this way is that it causes very weak signals to show up in the waterfall as faint traces against a black background. This can be very helpful when looking for DX, especially on a nearly dead band.

Figs 2 and 14 are the displays of SDRs (software defined radios) whose displays can be set for a much wider frequency span. The wider span allows us to see more patterns in the noise. Be cautious about reading too much into the relative strength of noise (and signals) over a frequency span greater than the bandwidth of the antenna you're using, or wider than the bandwidth of any bandpass filters that may be between the antenna and the SDR.

Note also that I have post-processed all of these analyzer "screen grabs" by converting them to grey scale and turning them negative to make them print better in hard copy. I didn't do that in earlier versions of this applications note, and the detail didn't show up nearly as well.

(Continued from page 21)

considerable trouble and expense to fix it himself! How many hams will buy this product because QST has showed them how to fix it? And what do you do if the noisy system belongs to your neighbor? Second, there are a few significant technical errors, mostly related to specific recommendations for the common mode chokes.

Active Noise Cancellers When we've done our best and still have noise, an active Noise Canceller can make a big dent in a *single* source, but it won't help with more than one source at a time. Noise Cancellers work by combining signals from our receive antenna with the signal from a "sense" antenna located near the source of the noise. The adjustable phasing network within the unit must then be carefully tweaked so that the two signals are equal in level and 180 degrees out of phase. This adjustment is frequency sensitive, so it must be readjusted each time we QSY. It must also be readjusted for every noise source. The MFJ 1026 and the DX Engineering NCC-1 are generally well regarded. Be careful when using any unit in line with the transceiver output - the carrier detector in my Timewave ANC-4 generated so much IMD that K6XX rang my phone within an hour of when I tried to use it that way.

Fluorescent Lighting can be noisy or quiet, mostly depending on the type of ballast used. Many screw-in replacements for incandescent bulbs tend to be quiet, but can become nasty noise generators when they get old and begin to fail. Traditional tube-type fluorescents use either older-style magnetic (linear) ballasts, which tend to be relatively quiet (until they fail) or more efficient electronic ballasts, which have the same noise issues as SMPS. Electronic ballasts are rated for industrial use (FCC Part 15 Class A, noisy) or residential use (FCC Part 15 Class B, about 20 dB quieter). With help from his local power company, W9RE traced severe interference on 15M to fluorescent lighting in a home 1,500 ft away.

Replacing an industrial-rated ballast with a residential unit can reduce the noise significantly. Noise is radiated by the tubes and wiring within the fixture, and on the ac power line. A common mode choke on the ac line can suppress the power line radiation, but shielding is generally required to kill radiation from the fixture. The shielding must be a continuous screen or mesh, and must be bonded to the fixture, and some scraping of paint may be required.

K6LL and W7WW report success with this line of LED replacements for fluorescent tubes that need no ballast - the AC line must be re-wired direct to the LEDs with no ballast. This work should be done by a qualified electrician.

earthled.com/collections/t8-t12-led-fluorescent-replacement-tube-lights-that-bypass-ballast-rewire

Direct plug-in replacements for fluorescent tubes are now being sold by "big box" stores. They are designed to work with existing ballasts. The jury is still out on how quiet they are; I've seen some positive reports, but see "Evaluating Equipment For Noise" at the beginning of Part Two.

Action Summary For Killing RF Noise

Study a Spectrum Analyzer Plot to determine whether it is impulse noise or electronically generated, and if electronically generated, its characteristics. Review Part One.

Is it impulse noise - broadband, no variation within a band, strongest at low frequencies, gets weaker with increasing frequency, covers a fairly wide area? If yes, it's probably something arcing within the power company's distribution system, or occasionally a neon sign. Try to get a bearing with a directional antenna, then listen with a mobile rig tuned for AM around 160 MHz, then when it gets loud, zero in on it by listening with an AM detector at UHF. When you hear it loud at UHF, get out of the car with a talkie tuned to that range. Then communicate what you've learned to the power company.

Is it electronically generated noise - harmonically related carriers that repeat every 10-100 kHz, stronger in some bands than in others? If the carriers are wobbly in frequency, are surrounded by humps of noise, and drift a

bit over time, the source is likely an SMPS. If the carrier(s) are relatively stable in frequency, the source is likely within digital equipment. Begin your search by listening with your rig running from a battery as you kill power to everything in your home, then finding and suppressing each noise you hear as you turn on one circuit breaker at a time.

Remember that most of us hear many noise sources, both impulse noise and electronic noise, and from many sources. The key to success is to identify and tackle them one at a time.

Kill electronically generated noise by replacing noisy products with clean ones, or by applying common mode chokes to all wiring connected to each source, one at a time. If there are multiple sources on a circuit, turn all off but one and suppress it, then turn that source off and move on to the next. When you find a source you cannot suppress, turn it off and work on the others.

When a new noise appears, think like Sherlock Holmes. What new product have you (or your neighbor) bought? Is there a pattern to when you hear it? Can you connect that pattern to patterns of use of something that could be a noise source? Is it the same every day (perhaps tied to a circuit that senses daylight) or appliances that are used at certain times?

~Jim Brown K9YC



Replace Fluorescents with LED tubes but disconnect the noisy ballast:

<https://youtu.be/m5C2M24HbdM>

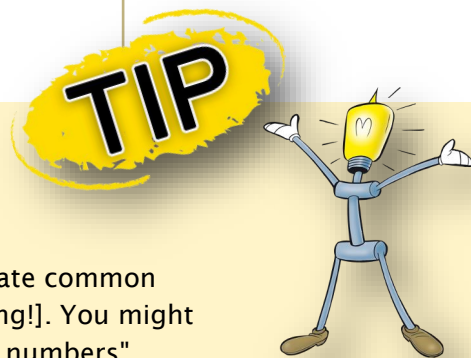
You may hear people using the term "73," meaning "best wishes." There is no "s" in the salutation "73." (Other hams may use the term "88," meaning "love and kisses." Typically used between husbands and wives.) These shortcuts were developed years ago as a way to communicate common thoughts quickly on CW. You will hear others saying "73s" and "88s" [wrong!]. You might even hear someone saying [cringe!] "threes and eights and all those good numbers" Negative!

Proper usage would be similar to this:

Voice: "OK, Dan, seven-three and I will talk to you later. (pause) VE7XXX."

Voice: "73 for now, VE6XXX clear."

CW: "VE7XXX de VE6XXX CUL OM 73 SK."



73 and 88 Etiquette

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Adam's Tech Topics

Adam Foley N1RKW

Getting Started in Ham Radio

I want to use this month's article to discuss my thoughts on how to be a cheapskate, or at least be a cheap ham.

I find it fascinating to see how our hobby brings together such a motley collection of people. Ham radio is a great hobby with a great wealth of diverse activities that can be pursued within its wide bounds, which is possibly why it attracts such an eclectic bunch of characters. Even within the relatively limited scope of our club's membership we have people who are engineers, teachers, doctors, laborers, technicians, factory workers, managers, retirees, and every other conceivable occupation. Each one of us seems to have differing interests within the hobby, ranging from working around the world with old radios that glow in the dark, to working the internet into radio

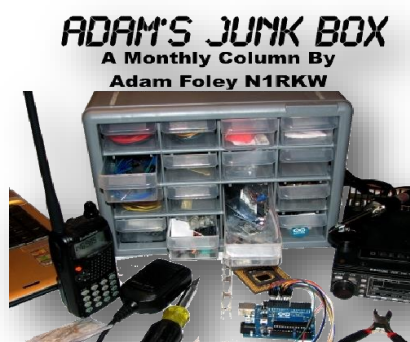
communications with computerized radios that glow from the bright gleam of LEDs, and everything in between. All of these activities have two things in common, they all require an amateur radio license, and they all require equipment that is expensive beyond belief.

There, I said it. (How dare he!) Ham radio is NOT a cheap hobby! (Blasphemer!) Yes, you can get started with a \$35 handheld radio, and even be perfectly happy using only that. But most of us, once we acquire our licenses and get a taste for the irresistible drug that is amateur radio, naturally

decide that we want more. We want more radios, more DX, more gear, more distance, more modes, more antennas, more blinky lights, more power, more everything! Much to the chagrin of our wallets, most of us start to collect these items as quickly as we can afford to purchase them. I can't count the number of times I've heard of hams that have spent their entire hobby budget, or their entire budget full stop, in one single trip to HRO. A brand new HF radio can cost anywhere from \$1000 to as much as NASA's yearly budget. A VHF radio can be less expensive, but one can still expect to spend \$500 or more depending on what features are desired. To be fair, a single-band 2-meter mobile radio can be purchased for around \$150, but that is a basic radio with few features.

Having said all of this, I want to use this month's article to discuss my thoughts on how to be a cheapskate, or at least be a cheap ham. Please don't think of this as a set-in-stone, this-is-how-it-must-be-done kind of thing, but rather Adam's-opinion-on-how-it-might-be-done. Please keep that in mind when reading this. Also, please keep in mind a piece of advice I hear myself saying to other hams all the time when asked for equipment recommendations: "Get the radios and gear that will work best for what you wish to do in the hobby, not the stuff that I recommend because it works well for me." In other words, don't get it just because I like it.

There are a number of things in this hobby that will require us to open up our wallets and beat them into submission. You want



Guest Columnist Adam Foley N1RKW is a member of the Central New Hampshire Amateur Radio Club and contributes a monthly column "Adam's Junk Box" to their newsletter, also called The Communicator.

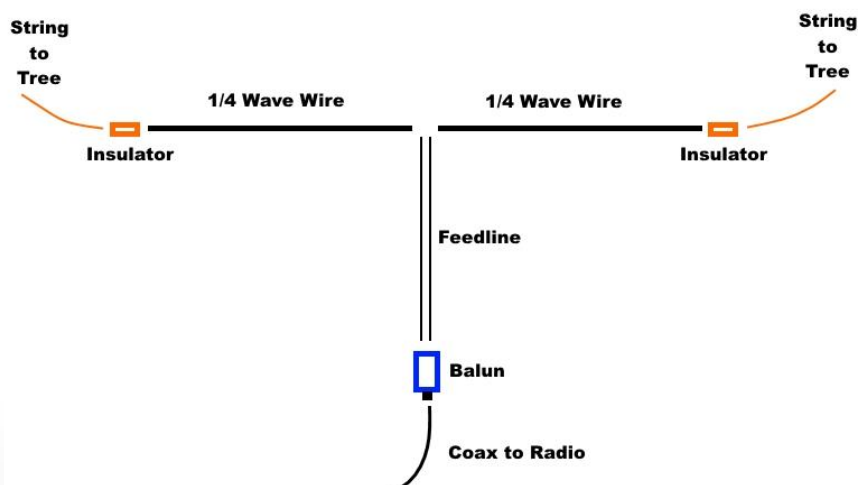
Adam also has a [YouTube Channel](#)

a tower? Be prepared to fork out some green paper. You need a legal-limit amplifier? You're going to need to cough up some dough. You want a high-end HF transceiver? Be prepared to empty your wallet completely, at least twice. Antennas, however, do not have to be one of these wallet destroying items. It is possible to build for yourself any and all antennas that you will ever use, depending on how handy and/or dedicated you are. Remember the j-pole article I wrote for February's Communicator? It costs roughly half as much to build your own as it does to buy one made by someone else. That is but one example of the many types of antennas that can be completely built by the enterprising ham for much less money than their commercial equivalents. HF antennas can be even easier to build. If you can cut a piece of wire, you can build an HF antenna. While wire is getting expensive these days due to the increasing costs of metal production, it is still much less expensive to make your own wire antenna than to buy someone else's. And by far the cheapest and easiest to build antenna that I know of is a simple quarter-wave 2-meter vertical made from an SO-239 jack and a couple of coat-hangers!



It doesn't get much cheaper than that! For the cost of some old stuff you probably already have hanging around the shack and 15 minutes of your time, you can be on the

air with your very own coat-hanger groundplane antenna. You can also build a single-band dipole antenna for almost anywhere on the spectrum simply by cutting 2 wires to one quarter-wavelength each for whichever frequency you want them to resonate on. It's that simple. Cut your two wires, hang them up from the ends using antenna insulators on the ends (these can be made of almost any non-conductive plastic material such as white PVC pipe), connect the inside ends of the wires to your feedline (a 1:1 balun or choke may be needed here), test it with your SWR meter, and you're on the air! See, it's this easy:



Multi-band dipoles and other antenna designs can also be quite simple to make, but there are far too many variations available for me to cover them in this article. Suffice it to say, there are any number of easy to construct do-it-yourself HF antennas out there. Google is your friend when it comes to finding one to suit your individual needs and wants.

I mentioned baluns previously, and they too can be cheap and easy to make. While it would take an entire article to go into their design and construction, and would require a heap of technical knowledge that I just don't possess, I can show you a 1:1 balun that I built from plans I found online *[next page]*

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To its right is a commercial 4:1 balun, and it's obvious that it wouldn't be difficult to build one of those either. Again, the plans for them can be found online, and there are so many different types out there that it can be confusing deciding which balun to use. The balun you use is dependent on what you have on either side of it, such as your antenna, feedline, and radio, so the baluns shown above are for example only. You will need to choose the proper balun for your

own individual setup and then decide whether to buy one or build your own (which I encourage, of course).

Speaking of radios and feedline, these don't have to be expensive either. I know that most of us are familiar with the concept of ham radio flea markets, especially NEARfest. However, for the benefit of those that are new to the hobby, or just have never experienced the magic of 1000 hams coming together for the purpose of buying and selling their old radio gear, I will explain a bit. NEARfest happens twice a year, usually May and October, and it is one of the biggest hamfests around. There are also several other smaller hamfests in the area, but NEARfest is the big one, at least for this neck of the woods. Dayton is THE BIG ONE, but I've never been there so I can't say much about it, other than that I want to go there someday, badly. You can get more info about when and where NEARfest happens at www.near-fest.com.

The reason I am devoting so much attention to these events is that these are great places to acquire ham radio gear of all kinds! If you are looking for feedline, you will see any number of people there selling coax and twin-lead, new and used, pristine and mouse-chewed. I once picked up several hundred feet of RG-213 coax for a mere \$10! To this day I am still using that coax. It's not the best coax in the world,

but it is sufficient for my needs and a whole lot better than the RG-58 I was using before then. I have picked up several radios there for decent prices, some test gear, spare parts, and even some helium-neon lasers which I have yet to find a use for. All of these things, and many more, were acquired at bargain-basement prices. A savvy shopper can walk out of a hamfest with an armload of very nice ham radio gear and still have a few pieces of green paper left in his or her wallet.

For folks that don't mind working a soldering iron and have a few spare parts on hand, even better deals can be had by purchasing dead or dying radio gear. I have several radios that I have saved from a fate worse than trash, and one that I am in the process of repairing right now. Sometimes the repairs are as simple as fixing a component with a failed solder joint, or cleaning dirty contacts. Other times they can get much more complex, but if you are patient and careful you can often get these rigs back into service.

Hamfests aren't the only place to get good used gear. There are any number of places to find radio gear at less than full price, including this very publication. Quite often there are ads run by club members who have gear that they want to sell, often at very good prices. Speaking of club members, there are also listings by club members on the CNHARC forums, which can be accessed through the club's web site, cnharc.org. Another place to look are web sites like Craigslist, QRZ, and eBay. While you will seldom be able to really look over what you are about to buy before pulling the trigger on these sites, a careful and patient shopper can score some very good deals.

These guidelines are only my own personal opinions, and much of this is probably old news to you, but I am hopeful that this may be helpful in some way to someone. As always, I welcome your comments and compliments, and to a lesser extent your criticism and critiques. I can be found by email at my call sign at hotmail dot com.

Thank you all for reading this article.

~ Adam Foley N1RKW
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Adam Foley N1RKW has been around ham radio most of his life, but didn't smarten up and get his license until 2008. Since then he has gone on to great heights (the 12' high roof of his old house, and the 3rd floor apartment he's in now), and recently decided to take up writing a monthly column about ham radio and electronics, two of the subjects he knows a little bit about (but not much). He lives in Laconia, NH with his incredibly tolerant wife and equally tolerant son and can be reached at I can be reached by email via N1RKW at hotmail dot com.



Radio-Active

Archie Frederick Collins

*Archie Frederick Collins (January 8, 1869 - January 3, 1952), who generally went by A. Frederick Collins, was a prominent early American experimenter in wireless telephony and prolific author of books and articles covering a wide range of scientific and technical subjects. His reputation was tarnished in 1913 when he was convicted of mail fraud related to stock promotion. However, after serving a year in prison, he returned to writing, including, beginning in 1922, *The Radio Amateur's Handbook*, still in print.*

Early Life

Collins was born in South Bend, Indiana to Captain Thomas Jefferson and Margaret Ann (Roller) Collins. He attended public schools and graduated from the Old University of Chicago, a Baptist school which preceded the present University of Chicago. His brother was author Dr. Thomas Byard Collins. After graduating, he began working for the Thomson-Houston Electric Company in Chicago in 1888. He married Evelyn Bandy on June 28, 1897, and they had a son, Virgil Dewey Collins, who also became an author, sharing writing credits on some of his father's books. Collins resided at a summer home called "The Antlers" in Rockland County, New York in the hamlet of Congers, and had a second residence in Florida. His winter residence was New York City, and he died in Nyack, New York.

Wireless Telephone

A. Frederick Collins demonstrating an induction wireless telephone (circa 1903)
Beginning in 1896, Guglielmo Marconi produced a radiotelegraph system that used spark transmitters, which could only be used by trained operators, and was limited to Morse code transmissions. In contrast, Collins sought to develop a wireless telephone that could be used by the general public for point-to-point communication.

Collins began researching the topic on his own in 1898. In November, 1899, the American Wireless Telephone and Telegraph Company, headquartered in Philadelphia, Pennsylvania, was founded by stock promoter Dr. Gustav P. Gehring as the first American radio communications firm. Initially Collins acted as that company's primary technical advisor, however, he soon had a falling-out and left the firm, even demanding that his photograph in a company prospectus be altered to make him unrecognizable.

Collins returned to doing his own research, investigating, in turn, wireless telephone systems that employed conduction, induction, and finally radio waves. He established a small laboratory at No. 132 South Sixth street in Philadelphia, forming a developmental company that initially was privately financed and did not sell stock to the public. After doing initial tests within a bowl of water, he reported that he then made steady, although somewhat limited, progress with the conduction and induction approaches, achieving transmission distances of 60 meters (200 feet) in 1899, 1.5 kilometers (1 mile) across the Delaware River in 1900, and 5 kilometers (3 miles) in 1902. That same year he constructed two experimental stations at Rockland Lake, New York, separated by 1.5 kilometers (1 mile), that successfully established two-way communication. In 1903, he made short-distance tests in the Hudson River in New York City, aboard the ferryboats John G. McCullough and Ridgewood and in July of that year predicted that "in a comparatively short space of time I am confident I shall telephone across the ocean".

In May, 1903, he formed the Collins Marine Wireless Telephone Company, which was later renamed the Collins Wireless Telephone Company, and served as technical director until 1910.



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Collins' conduction and induction wireless telephone apparatus was similar to that employed by Alexander Graham Bell, Amos Dolbear and Nathan Stubblefield. (Bell's work never went beyond the demonstration stage, and Dolbear's patent, controlled by the American Wireless Telephone and Telegraph Company, was ruled by the US courts to be largely impractical. In 1902, Stubblefield sold the rights to his system to the newly formed Wireless Telephone Company of America, and in August, 1902 a Wireless Telephone advertisement stated that "Nathan Stubblefield and Prof. A. Frederick Collins are now working together for the sole benefit of that company". However, Stubblefield had actually withdrawn from the firm in June, due to his concerns that it was primarily a fraudulent stock promotion scheme).

Despite Collins' initial optimism, he had no more success than the others in developing a commercial system using conduction or induction transmissions, due to the inherent limitations of these technologies. He next began developing a radiotelephone that employed continuous-wave radio signals. In 1904, Danish inventor Valdemar Poulsen had introduced the arc-transmitter, which, unlike the intermittent pulses produced by spark transmitters, created steady signals that could be used for amplitude modulated (AM) audio transmissions. Poulsen had sold the US rights to his patents to the Federal Telegraph Company, but Collins claimed that he had independently begun research on the same idea in 1902.

Collins was granted US patent 814,942 on March 13, 1906 for an arc-transmitter improvement which separated the telephone microphone circuit from the arc circuit, to avoid the

problem of the arc current burning out the microphone. Although this was merely an incremental improvement on existing arc-transmitter technology, the company's stock promotion advertisements claimed this patent was "a broad one, covering the fundamental principles for transmitting and receiving articulate speech without connecting wires" that was supposedly "considered by the highest authorities on patent law to be one of the strongest to be issued since the one granted to Bell in 1876". (Early purchasers of Bell telephone stock had reaped fortunes, so it was a common tactic for early radio company stock promotions, aimed at impressionable "get-rich-quick" buyers, to suggest that similar increases would occur).

The electromagnetic radiation (radio waves) produced by arc-transmitters was created by an electric arc burning between two electrodes. In Collins' case the electrodes rotated in opposite directions, to provide even wear of their surfaces, thus was called a "revolving oscillating arc". Collins also developed multiple unit water-cooled microphones which could carry heavier currents of 8 to 10 amperes. For a receiver, he used a thermo-electric detector of his own design.

Collins began making demonstration radiotelephone transmissions from his lab at 51 Clinton Street in Newark, New Jersey that were sent to increasingly distant locations. On July 9, 1908 a test was heard at the Singer Building in New York City, 19 kilometers (12 miles) away. Transmissions over the next two days were reportedly received in Congers, New York, 56 kilometers (35 miles) distant, and Philadelphia, a distance of 130 kilometers (81 miles). After witnessing an October, 1908 demonstration at the New York Electrical Show, Guglielmo Marconi was quoted as saying: "Wireless telephony is an accomplished fact, and to Mr. Collins is due the credit of its invention... The clarity of the transmitted voice is marvelous." In 1909, Collins claimed that his company had established four radiotelephone links operating simultaneously between Portland, Maine and a nearby island, although there is little evidence that this was

true. That same year he exhibited his wireless telephone at the Alaska-Yukon-Pacific Exposition and was awarded a gold medal.

Despite Collins' reported successes, his efforts actually fell short of creating a commercially viable radiotelephone. This was also true for other experimenters doing arc-transmitter radiotelephone research during this period, including Lee DeForest and Charles Herrold. Despite their best efforts, arc-transmitters would prove to be too unrefined to be usable for audio transmissions, and a successful radiotelephone would not be realized until vacuum-tube transmitters were developed in the mid-1910s.

In December, 1909, the Collins Wireless Telephone Company was merged with three others, the "Pacific Wireless Telegraph Company, the Clark Wireless Telegraph Company, and the Massie Wireless Telegraph Company" to form the Continental Wireless Telephone and Telegraph Company, with Collins the new company's Technical Director. Advertisements claimed that Continental was in the process of creating a nationwide service. However, in view of the increasingly shady reputation of its officers, both Walter Massie and Thomas Clark soon withdrew from participation.

Mail Fraud Prosecution

Collins participated in demonstrations promoting stock sales, which over time included extravagant and misleading claims. A common company tactic was to set up a demonstration at a hotel in a targeted town, and, after successfully talking between two rooms using the short-range induction system, claim that a community-wide radiotelephone exchange had also been perfected, and would be installed pending financing by local stock sales. These tests were widely publicized, featuring promotional photographs of prominent persons, including William Jennings Bryan and US President William Howard Taft, using the company's devices. The company also claimed that soon "every auto will be provided with a portable wireless telephone". However, the



radiotelephone systems were never actually constructed

Concerned by excesses in the radio communications industry, the US federal government instituted a series of prosecutions, and in June, 1910 inspectors from the United States Postal Department began making arrests, beginning with officials of the notorious United Wireless Telegraph Company. In December, 1911 Collins and three of his associates were arrested, and charged with mail fraud in connection with the promotion of both Collins Wireless and its Continental Wireless successor. The indictment charges included overstating the scope of the company's patents, and also fraudulently claiming that its radiotelephone equipment had been perfected to the point that it was ready for widespread commercial deployment. In a trial that ended in early 1913, Collins was one of the three defendants found guilty, and was sentenced to three-years imprisonment, although he would be released after serving one year.

Publications

Collins began his writing career in 1901, and his articles about wireless telephony appeared in *Electrical World*, *Scientific American*, *Encyclopedia Americana*, and other encyclopedias. He also wrote numerous technical articles and books on wireless telegraphy and telephony in the first decade of the 20th century. His 1913 *Manual of Wireless Telegraphy and*

Telephony provided a detailed and illustrated explanation of his electric arc wireless telephone transmitter and receiver, along with a general coverage of the state of the art.

Following his release from prison in 1914,

Collins did no further work as an electrical engineer. Embittered by his treatment, in 1917 his wife, Evelyn, filed for a separation, stating that Collins "had come back to freedom... with his disposition ruined", "soured against the world, soured against even his benefactors, and soured against her", and engaging in "long harangues and tirades of invectives against the world in general and the United States government in particular". However, he eventually re-established himself, and, appearing as himself in one of his juvenile novels, proclaimed that although he had suffered "hard falls" and was "stoop-shouldered" from "the weight of his own tragedies", he was persevering because he was "a bit battle scarred but my skin is as thick as that of a rhinoceros". He continued authoring an impressive number of books covering a variety of topics, many intended for younger readers. In particular, he was an enthusiastic proponent of amateur radio, writing in the 1915 *The Book of Wireless* that "All you need to become a member of the great and growing army of wireless boys is the desire to own a station, and the rest is easy", while offering to personally answer any letters requesting assistance with technical problems. In 1922 his *The Radio Amateur's Hand Book* was introduced, which was reprinted in at least 15 revised editions over the next 61 years.

In the fiction arena, his three-part "Jack Heaton" adventure series reviewed its title character's exploits as a Wireless Operator (1919), Oil Prospector (1920) and Gold Seeker (1921). However, most of his works were non-fiction. By 1919 his books included *Inventing for Boys*, *Handicraft for Boys*, and *The Boys' Book of Submarines*. The 1922 edition of *The Book of Wireless Telegraph and Telephone* lists 22 additional titles, ranging from *Boys' and Girls' Book of Outdoor Games* to numerous scientific and technical subjects, including *The Amateur Chemist and Gas*, *Gasoline and Oil Engines*. Many of his books, such as *The Boy Scientist*, (1925) had comprehensive illustrations and few equations, with an emphasis on "hands-

on" experimentation, at a level intended for high school students. After discussing the "Einstein Theory," Collins tells his readers how to build a spectroscope, a radio receiver, and an x-ray machine for home experimentation. In 1941, a book review reported that "A. Frederick Collins has to his credit some 37 'self-help' and practical books ranking from chemistry and electricity and the stars to household mechanics, your car, and gardening." He eventually wrote about 100 books on scientific and technical subjects, hobbies, and sports, plus over 500 articles in technical and scientific magazines and journals.

Legacy

Collins' writings played an important role in disseminating information about early radio advances (then known as "wireless telegraphy and telephony"), and, in the foreword to 1922 edition of *The Radio Amateur's Hand Book*, he included "Historian of Wireless "1910" among his accomplishments. (He also claimed the title of "Inventor of the Wireless Telephone 1899"). Donald McNicol, who would later serve as president of the Institute of Radio Engineers, stated that Collins' "How to Construct An Efficient Wireless Telegraph Apparatus at Small Cost", which appeared in a 1902 issue of the *Scientific American Supplement*, "did more to introduce the art of amateur radio than anything else that had appeared". McNicol later expanded his remarks, writing: "amateur experimenters in wireless were at that early date provided with descriptive text enabling them to set up equipment for the duplication of experiments performed by the foremost workers. Undoubtedly Collins's articles on wireless started many of the amateurs and engineers on the road to whatever success they achieved".

Alan MacDiarmid, the 2000 Nobel Prize Laureate in chemistry, said that Collins' 1924 book *The Boy Chemist* so inspired him as a boy in New Zealand that he kept renewing it from the public library for almost a full year in order to complete all the experiments.



March 2017



SteppIR Repair

John White VA7JW

Yagi For Sale:

3 Element SteppIR Yagi, Element housing Units (motors) recently refurbished and includes the controller, all working, with original manuals, and other useful documentation. Asking \$1,000 OBO. Pick up from North Shore Amateur Radio Club. Call John, VA7JW 604-936-2367 or cell 604-802-8367, or email va7jw@shaw.ca for details.

~John White

The North Shore Amateur Radio Club's 3 element yagi SteppIR antenna experienced a failure of a nature that turned out to be a common problem, being one of the early SteppIR production models. A component in the EHU's, Element Housing Unit's, had failed rendering the antenna non-functional. There is a "spindle" in the EHU that attaches directly to the drive shaft of the stepper motors. The spindle has two sprockets on the spindle that engage the holes in the antenna tapes thereby spooling the antenna tapes in and out of the fiberglass element tubes. The shaft of the spindle is locked to the motor shaft with a roll pin, straight through the motor shaft and spindle. The spindle shaft is made of a plastic material. The pin area is the "single point of drive" and being small, is the high pressure point in the drive system. The metal shaft of the motor is strong whereas the plastic spindle shaft is weaker and typically fractures at the pin connection, and breaks free.

When the spindle departed the motor shaft, the tapes became stranded and the antenna no longer worked. Of course not all spindles broke at the same time and so performance degradation was not necessarily noticed right away.

Disassembly of the failed EHU's revealed 2 spindles completely

broken off the motor shaft and the third was fractured and was about to fall off. SteppIR now has a robust replacement spindle available. One can send the motor units to SteppIR for repair (cost of parts, labor and shipping) or you can do it yourself; cost for materials and shipping was about \$130 CAD.

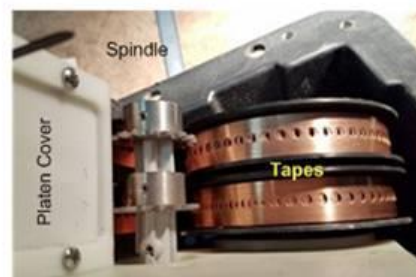


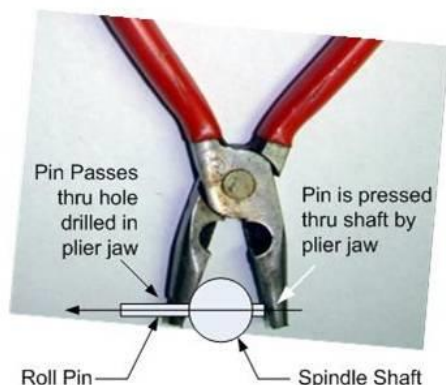
Fig 6. Tapes behind the Platen Cover



Fig 4. Broken Spindles

Replacing the spindles in the EHU is not so easy. SteppIR does supply an instruction paper as to how to replace the spindles. However, not being familiar with the internal structure or components in the EHU, nor the nomenclature being used, and with no diagrams it was very time consuming to gain an understanding as to what and how to do the repair.

Never-the-less, the units were opened up. Immediately found that the Roll Pin in the motor shaft is lodged impossibly tight and there is no room to apply tools to pull or push the pin out. The thinking was that the new spindle could be simply dropped



on to the motor shaft and the pin replaced with the newly supplied spindle. No way. Frustrated, I called SteppIR support and learned that the internal assembly has to be released from the EHU and tilted up out of the EHU housing to gain access. This was starting to get complicated.

I called upon Keith VE7KW to lend a hand explaining the problem with the pin removal. He had experience with Roll Pins and fashioned a tool specifically to remove the pins. This greatly assisted the work once figure out how to tilt the assembly up to get working space, which greatly eased the pin replacement. We took apart, replaced the spindles, and put the assembly back in place in the EHU's. We were able to reassembled all 3 units in about 2 hours.

Each unit was wired to the Controller and tested on the bench before final assembly to be sure everything was working properly. All other components in the EHU were inspected and looked just fine. Note that the bottom plates could not be installed at this time as the EHU's had to be visually observed to see that the tapes were running smoothly.

When that was all done, a DRAIN hole was drilled in each bottom plate and a screen was glued in place on the inside. The bottom plate could then be installed with the new gaskets. Again, all units were tested with the Controller to ensure all still working well.

Regards the drain holes, my personal SteppIR failed from water entrapment in the EHU's as there was no drain hole. Water gets in but can't get out. Fortunately SteppIR had a trade-in replacement program for a while which I took advantage of some years ago. The new replacement units now have drain holes.

~ John VA7JW

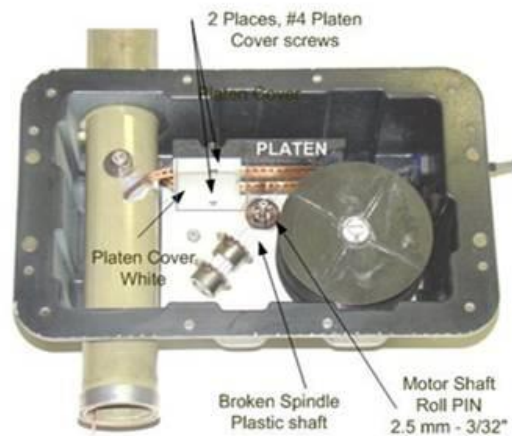
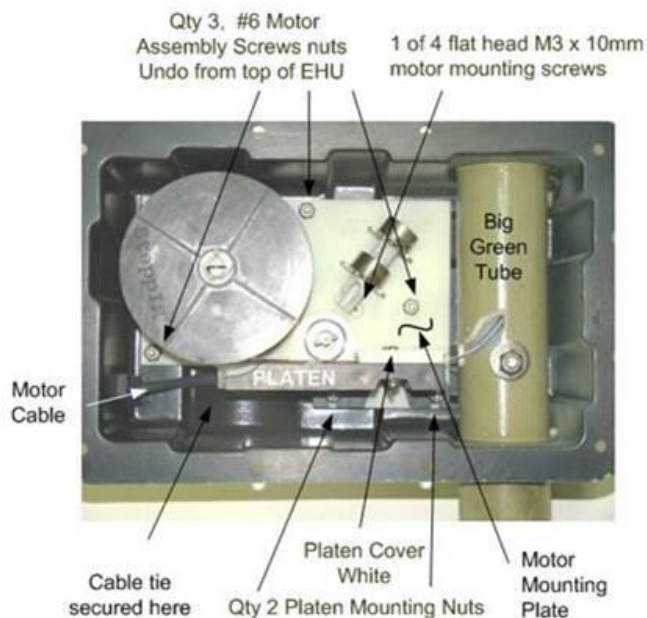


Fig 3A View 1, EHU Component Identification



Note: This repair is not for the faint-of-heart. John has prepared detailed repair instructions which he has generously offered to share upon request. A few of the photos from the repair instructions are included in the short summary above.

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Tidbits from the Amateur Radio World

Use of Electronic Devices While Driving Update

Late Breaking News

Bill Gipps led the team, working with Provincial government. BC Amateurs got 90% of what we wanted - but we will have to clear up the issue of Ham Radio and dispatch devices. Bill thought we had it removed - but when they saw the whole document days before it was to be released, it was still in there. The Province was reluctant to remove it at the last minute because it hadn't been run past the other stakeholders.

The part that should be very clear now is that the use of a hand held microphone is permitted while driving. We'll call that a win.

Bill suggests that hams print a copy of this policy and keep it with their license in the glove box. If there is an issue, and someone is charged, contact RAC and they will work with the individual and the Province to resolve.

Hand Microphones

A "hand microphone" is a ½ duplex communication device used principally for commercial purposes (e.g., delivery business). The device consists of a hand-held unit that:

- Is both receiver and microphone.
- Is operated by a push and hold-to-talk function.
- Allows for oral communication, but not for the

transmission and receipt of oral communication at the same time.

A person may use a hand microphone while driving if:

- The device is within easy reach of the driver's seat.
- The device is securely fixed to the motor vehicle or worn

securely on the person's body in a manner that does not obstruct the person's view of the front or sides of the motor vehicle or interfere with the safety or operating equipment of the motor vehicle.

Two-way Radios

Two-way radios are ½ duplex VHF, UHF and HF communication devices that permit the transmission of sound over a radio frequency. Two-way radios have been used by drivers for decades, most commonly by search and rescue, commercial drivers, long-haul truck drivers, citizen band (CB) and amateur radio operators.

A two-way radio consists of a hand-held microphone connected to a transceiver unit that is operated by a push and hold-to-talk function and allows for oral communication, but not for the



transmission and receipt of oral communication at the same time.

A person may use a two-way radio while driving if the transceiver:

- Is within easy reach of the driver's seat; and
- Is securely fixed to the motor vehicle or worn securely on the person's body in a manner that does not obstruct the person's view of the front or sides of the motor vehicle or interfere with the safety or operating equipment of the motor vehicle.

Note: Hand microphones, including two-way radios, may only be used in the push and hold-to-talk function while driving. Other functions on these devices cannot be operated by a driver while driving.



DEVICES ALLOWED FOR USE BY INDUSTRY OR BY LICENSED AMATEUR RADIO OPERATORS

Mobile Data Terminals

Mobile data terminals are non-hand-held computerized devices without a telephone function that are licensed through Industry Canada under the Radiocommunication Act (Canada). These devices are used exclusively to communicate with a dispatcher or control centre and where pre-packaged data are transmitted, point in time, over a set radio frequency.

In British Columbia, the Motor Vehicle Act (MVA) defines British Columbia road laws and delegates authority to the Superintendent of Motor Vehicles to regulate driver behaviour. Since January 1, 2010, amendments to the MVA have prohibited the use of hand-held electronic devices while driving.

This information pertains to permitted and non-permitted electronic devices and uses while driving in accordance with Part 3.1 of the MVA and the [Use of Electronic Devices While Driving Regulation](#)



March 2017



Radio Amateurs of du Canada

More On Canada 150

*The new version of
RIC-3 can be found
online at:*

<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01008.html>

Radio Amateurs of Canada has secured permission for all Canadian Radio Amateurs to use special call sign prefixes to celebrate the 150th anniversary of Canada's Confederation.

The Georgian Bay Amateur Radio Club (GBARC) has been granted the special call sign VC3OS for its use throughout all of 2017 to commemorate the sesquicentennial as well as the 160th anniversary of the City of Owen Sound.

The Challenge

To encourage participation and to challenge Georgian Bay Amateur Radio Club (GBARC) members by way of Amateur Radio operations in celebration of the Canada 150 anniversary.

This is a fun activity meant to engage and promote Amateur Radio within Canada and the GBARC membership. We are encouraging all GBARC members to participate in this Canada-wide QSO at our club level.

General Rules

Obtain 1 QSO contact per Province or Territory (13) in Canada, 1 point per QSO will be awarded using any mode of operation on any band between February 1 and December 1.

A minimum of 10 points is required to complete this challenge.

However, you don't have to stop here, we are also looking for:

Top QSO Point Score which will include an operator with the minimum of 10 contacts (identified above) as well as their total number of QSO contacts within Canada during February 1 and December 1.

Any mode of operation can be used. (CW, QRP, PSK, EHCO Link Voice etc)

Any band of operation is permissible. (2m, 70 cm, 6-160 MHz etc)

** Record all of your contacts and email your completed QSO contact form(s) to srobinson@criticom.ca each month. These results and any information updates will be posted on the GBARC Forum for your interest.

Recognition & Awards

Recognition for participation and completion of this challenge as well as an award for the Top QSO total point score will be presented at the GBARC Annual Christmas Luncheon.

For more information on the GBARC Challenge visit http://www.gbarc.ca/Canada_2017.php

If you have any questions or concerns, please feel free to contact me or see the GBARC Forum.

Scott Robinson
Canada 150 Coordinator
srobinson@criticom.ca



In celebration of Canada's 150th Birthday in 2017, the Yukon Canam Contest Club, VY1AAA, will be active using the special call XK150YUKON, from January 1 through March 1, 2017.

For the remainder of the year, we will be active as either C11AAA or VY1AAA.

QSLs via KC1CWF and always confirmed on LOTW.

~ Gerry Hull, VE1RM/W1VE
VY1AAA Trustee



Registration Opens Feb 15

The 35th anniversary of the SEA-PAC Northwest ARRL Division Ham Convention opened online for registrations on February 15, 2017. You can save \$5 by registering online or by mail instead of standing in line at the door. Visit www.seapac.org for additional details and to pre-register.

Many of the hotel and motels have already received reservations for this year's convention on June 2-5. Attendees are encouraged to make reservations now, as many of the nearby hotels sell out early. Check the lodging special rates at www.seapac.org.

Workshops only are held on Friday June 2. Seminars, flea market, commercial exhibits and other activities are on Saturday and Sunday, June 3-4, and remember... no sales tax in Oregon! The Saturday night banquet features a return performance by the Woodlander musical group.

This year's SEA-PAC is shaping up to be even bigger and better than ever. ARRL Chief Executive Officer, Tom Gallagher, NY2RF and other league officials will attend to speak and meet our attendees.

Plan now to bring the family for a wonderful weekend at SEA-PAC, located in Seaside, Oregon near the beautiful Pacific Ocean beach.

March 2017



Check It Out

John Schouten VE7TI

For Smartphones, Tablets and Computers

APRS is Automatic Packet Reporting System, an amateur radio based system for real time digital communications of information of immediate value in the local area. Data can include object Global Positioning System (GPS) coordinates, weather station telemetry, text messages, announcements, queries, and other telemetry. Normally it takes a transceiver and APRS/GPS module to be active on the system, but now there are various apps that only require a smartphone or tablet. APRS data can be displayed on a map, which can show stations, objects, tracks of moving objects, weather stations, search and rescue data, and direction finding data.

APRS data is typically transmitted on a single shared frequency (depending on country) to be repeated locally by area relay stations (digipeaters) for widespread local consumption. In the Vancouver area that is 144.39 Mhz simplex. In addition, all such data is typically ingested into the APRS Internet System (APRS-IS) via an Internet-connected receiver (IGate) and distributed globally for ubiquitous and immediate access. Data shared via radio or Internet is collected by all users and can be combined with external map data to build a shared live view.

APRS has been developed since the late 1980s by Bob Bruninga, call sign WB4APR, currently a senior research engineer at the United States Naval Academy. He still maintains the main APRS Web site. The initials "APRS" were derived from his call sign.

There are various iPhone, Android and computer apps to initiate and monitor APRS traffic. I was using an old Radio Shack HTX-202 and a TinyTrak module. Nowadays it can be done much simpler, and I prefer OpenAPRS iPhone Edition. Paired with iPhone's built in map engine, Internet connection and GPS, OpenAPRS gives you access to check your APRS messages, beacon your position, speed and

direction, and view other Amateur Radio APRS operators anywhere in the world.

Even without an attached transceiver, you can beacon your position while the app is in the background. Send your position with any model iPhone or iPad by assisted GPS, cell phone triangulation or manual coordinate entry. Share your trip with your friends as they view you on their iPhones, APRS software connected to APRS-IS or on the OpenAPRS website:

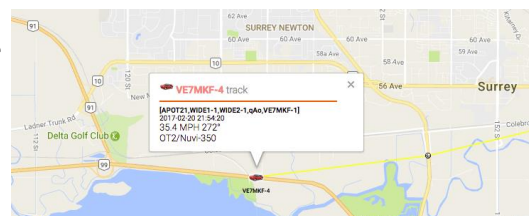
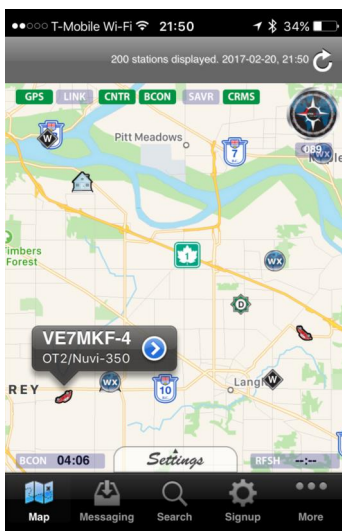
<http://www.openaprs.net/>. Posted positions can also be viewed at other APRS websites such as aprs.fi and findu.com

Check your APRS messages or send a message to a friend right from OpenAPRS iPhone Edition. OpenAPRS servers are always on to receive and store your messages so you don't have to keep a station running 24/7. Never miss a message again!

Non or aspiring Amateur Radio operators can also view APRS activity near them on OpenAPRS iPhone Edition but will not be able to send their position or messages.

A free account with OpenAPRS is required to send your position or send and receive messages. Signing up is easy, simply open up OpenAPRS iPhone Edition, click the signup tab, fill out the form and click Signup! The app will automatically contact the servers and set up your account. You will need to have a valid email account to receive our activation message to activate your account.

~ John VE7TI



March 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
For details on all SARC events, go to ve7sar.net For details on all SEPARS events, go to separ.shutterfly.com/calendar			1	2 1930 SEPAR Simplex Check- in	3	4 0900 Klub Koffee Klatch: Kalmar Family Restaurant, King George Blvd & 81 st Ave. CONTEST: ARRL International DX contest (SSB)
5 Burnaby Swap Meet (see pg31) CONTEST: ARRL International DX contest (SSB)	6	7 1930 SEPAR Net 2000 SARC Net	8 1900 SARC General Meeting	9 1930 SEPAR Simplex Check- in	10 Alexander Graham Bell's 1st telephone call... Hello?	11 0900 Klub Koffee Klatch: Kalmar Family Restaurant CONTEST: RSGB Commonwealth contest (CW)
12 Daylight Savings CONTEST: RSGB Commonwealth contest (CW)	13	14 1930 SEPAR Net 2000 SARC Net Spring SARC BASIC Course starts	15	16 1930 SEPAR Simplex Check- in	17	18 0900 Klub Koffee Klatch: Kalmar Family Restaurant CONTEST: BARTG HF RTTY contest
19 CONTEST: BARTG HF RTTY contest	20 Int'l Day of Happiness - Make a contact today!	21 1930 SEPAR Net 2000 SARC Net	22 SARC Exec Meeting	23	24	25 0900 Klub Koffee Klatch: Kalmar Family Restaurant CONTEST: CQ WW WPX contest (SSB)
26 CONTEST: CQ WW WPX contest (SSB)	27	28 1930 SEPAR Net 2000 SARC Net	29	30	31	

March 2017

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ve7sar.net

Between newsletters, watch your e-mail for announcements of events, monthly meetings and training opportunities. These announcements can also be found on our web page, or via:

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or

tinyurl.com/SARCphoto

QRT

John Schouten VE7TI

A Birthday Present

My eldest grandson was about to have a birthday so as usual my wife and I discussed what would be appropriate for an eight-year-old. I thought back to my time as a youngster and decided that perhaps he was going to be old enough to start experimenting with electronics.

My career in that field started at about the same age when I was given a RadioShack 20-in-1 electronics experimenter set. I fondly recall spending hours upon hours building and rebuilding the projects and then carefully attempting to build some circuits of my own.

The projects were by no means complicated and, as I recall, there were several resistors, a couple capacitors, no integrated circuits at that time, but there were several transistors, enough to make a very basic AM radio that sounded horribly tinny but brought in several strong local stations like CKNW, CFUN and CKWX.

My brother, several years older than I, had purchased a Trio shortwave receiver from LaFayette Electronics at 'House of Stein' a downtown Granville street electronics store. He would spend hours in the evening listening to shortwave broadcast from around the globe. He was not particularly electronics adept and at one occasion a great puff of smoke rose from his receiver when he tried some homebrew tuning. Undeterred he purchased another receiver of the same make and model and carried on although I never saw him trying to tune it again. To this day, the joke about whether he was ever able to receive Japan, carries on.

Try as I might I could never get beyond local radio stations with my kit. It wasn't until several years later that I was given a very basic shortwave receiver kit, built from about a dozen parts, and therefore was not particularly sensitive although I could tune to Radio Moscow, Radio America and the BBC. I think back on those times as the spark that started my path in electronics and eventually to obtaining my amateur radio license.

I was able to find a very nice kit by a company called [Elenco](http://Elenco.com) via eBay. The kit boasts the ability to build up to 100 different projects. It includes three integrated circuits, one resistor, the battery box, a speaker, a motor and a number of modular connectors. The integrated circuits certainly cut down on the amount of wiring, but also opens up possibilities not available during my experimentation 50+ years ago. Things such as NOR gates, AND gates and other digital logic projects.

His birthday is in March and time will tell whether this will be as successful an investment as it was for me on my birthday. There are six hams in the family now and his mother passed the VECTOR Basic course with flying colours AND got her CW endorsement to boot, so I'm sure she will be supportive. I'll try to update in due course as to how it worked out, but perhaps this will mark the birth of another VE7 2B in the family.

~ John VE7TI

Communicator Editor



It's March!

At our meeting on March 8th we look forward to Kevin McQuiggin VE7SD with a presentation on 'Introduction to Gnuradio'.

Digital radio is here to stay, and represents a significant improvement in signal processing. This presentation will cover the basics of digital radio and highlight a powerful new open source tool for the design of radio transmitters and receivers called "gnuradio".

Everything from simple receivers and transmitters to complex cellular repeaters, WiFi, and satellite receivers can be built using gnuradio and its associated utilities. Circuit elements such as filters, modulators and demodulators are represented in gnuradio by "blocks" that can be hooked together using a simple "drag and drop" user interface. Once the blocks are all connected into a "flowgraph", the software radio is "executed" and performs its function.

The presentation will look at current digitizing radios (the necessary "front end" for any radio) and cover the design of a basic software receiver in gnuradio. It will also provide a demonstration of a couple of gnuradio-based receivers and transmitters, including an Inmarsat satellite control channel decoder that operates in L-Band (around 1.5 GHz) which was written from scratch by the presenter. Inmarsat is heavily used by commercial airlines to pass traffic on logistics, weather and aircraft performance to and from aircraft in flight.

References and URLs to great learning resources on software-defined radio, and gnuradio itself, will also be provided.

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

	SARC Net 20:00 Hrs
1 st Tuesday Standby	Drew VA7DRW Rob VE7CZV
2 nd Tuesday Standby	Jinty VA7JMR Sheldon VA7XNL
3 rd Tuesday Standby	Rob VE7CZV Vacant
4 th Tuesday Standby	Kapila VE7KGK John VA7XB
5 th Tuesday Standby	Robert VA7FMR Rob VE7CZV
Want a turn at Net Control? Contact the SARC Net Manager	

Down The Log...

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hr at the PREOC
Emergency Mgmt BC
14292 Green Timbers
Way, Surrey, BC

Weekly Club Breakfast

Saturday at 0900 hr
Kalmar Family Restaurant
8076 King George Blvd.
Surrey

SARC Net

Tuesday at 2000 hr local
on 147.360 MHz (+)
Tone=110.9

SEPARS Net

Tuesday at 1915 hr local
on 147.360 MHz (+)
Tone=110.9

VE7RSC Repeater

2m: 147.360MHz+
Tone= 110.9Hz
IRLP node 1736
Echolink node 496228

1.2m: 223.960 Mhz -1.6
Tone=110.9

70cm: 443.775MHz+
Tone= 110.9Hz
IRLP node 1737



We Have A SARC Patch!

These are suitable for sewing on a jacket, cap or your jammies, so you can proudly display your support for the club.

The price is \$4 each or three for \$10 and they can be picked up at a meeting or the weekly Koffee Klatch.

Burnaby Radio Communications

Michael J. Wong VE7HMW
President/Owner

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Burnaby, B.C. V5C 2J5
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